MASS.
HS30.801:
988-990

UMASS/AMHERST
312066016960479

Digitized by the Internet Archive
in 2014

https://archive.org/details/nutritioncountsm9889mass

MASS. HS30.801: 988

GOVE ENTS
1989
University of Massachusetts
Depository Copy

63
Black
PD

NUTRITION COUNTS

Massachusetts Nutrition Surveillance System
FY'88 Annual Report

Massachusetts Department of Public Health
Health Promotion Sciences
Office of Nutrition
Bureau of Parent, Child and Adolescent Health
Office of Statistics and Evaluation

November 1988

NUTRITION COUNTS

MASSACHUSETTS NUTRITION SURVEILLANCE SYSTEM

FY'88 ANNUAL REPORT

November 1988

Prepared by:

Jean L. Wiecha, MS
Carole A. Grandon, MS
Patrice Fisher-Miller, MPH
Catherine Boisvert Walsh, MPH, RD
Karen E. Peterson, DSc, RD

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC HEALTH

Michael S. Dukakis, Governor
Philip W. Johnston, Secretary, Executive Office of Human Services
Deborah Prothrow-Stith, MD, Commissioner, Department of Public Health
Howard Spivak, MD, Deputy Commissioner, Health Promotion Sciences
Deborah Klein Walker, Ed D, Assistant Commissioner,
Bureau of Parent, Child and Adolescent Health

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH
Health Promotion Sciences
Office of Nutrition (Ruth Palombo, MS, RD, Director)
Bureau of Parent, Child and Adolescent Health
Office of Statistics and Evaluation (Marlene Anderka, MPH, Director)

ACKNOWLEDGEMENTS

We are indebted to all of the individuals at Head Start programs throughout Massachusetts who participated in Nutrition Counts in FY88: they made the first year of this project possible through their interest, cooperation and patience. We also thank Cecilia Bennett for her significant contributions early in the project, and the Administration for Children, Youth and Families, Head Start Bureau for their continued support.

For more information on Nutrition Counts, contact:

Carole Grandon, MS / Jean Wiecha, MS
Coordinators for Nutrition Surveillance and Special Projects
Office of Nutrition
Massachusetts Department of Public Health
150 Tremont Street
Boston, MA 02111

TABLE OF CONTENTS

SUMMARY i

INTRODUCTION 1

PART I: PROJECT DESCRIPTION AND RESULTS 2

- Description of Nutrition Counts 3
- Results 13
- Tables 17

PART II: PROJECT EVALUATION AND DISCUSSION 22

- Evaluation 23
- Discussion 26
- Recommendations 30

LITERATURE CITED 32

APPENDICES 33

NUTRITION COUNTS
SUMMARY OF FINDINGS AND RECOMMENDATIONS

During FY88 1727 Massachusetts children ranging in age from 2 years 9 months to 6 years from ten Head Start programs were measured to identify children with nutritional problems. This report presents results for 1605 Head Start children, of whom 61.0% were White, 23.9% were Hispanic, 10.0% were Black and 3.9% were Asian.

The most prevalent nutrition-related problems were overweight, short stature and iron deficiency anemia. These findings are consistent with those of the 1983 Massachusetts Nutrition Survey as well as the Centers for Disease Control Nutrition Surveillance Annual Summary (1983). Out of 1605 Nutrition Counts children, 9.6% were considered overweight (high weight for height). Short stature (low height for age) was observed in 7.8% of children. Probable iron deficiency anemia (low hematocrit and/or hemoglobin) occurred in 7.4% of the 1168 children with hematocrit or hemoglobin measures. The prevalence of underweight (low weight for height) was 1.4%. Overall, greater than one in five children exhibited at least one indicator of malnutrition (underweight, overweight, short stature, or anemia). When overweight was excluded, greater than one in seven children had one or more indicators of undernutrition.

Because previous studies of nutritional status of Massachusetts children have shown a correlation between attained height and race, we looked at the distribution of low height for age by race in this sample. Among all children in this sample who exhibited short stature (low height for age), 68.8% were White, 17.6% were Hispanic, 7.2% were Asian and 6.4% were Black. However, within each racial group 8.8% of White children, 5.7% of Hispanics, 5.0% of Blacks and 14.3% of Asians had short stature.

Other results indicate that of 1454 Nutrition Counts children with reported birthweights 7.0% were considered low birthweight (< 5.5 pounds or 2500 grams). Of 1174 children with blood pressures reported, 2.0% exhibited high blood pressure. High blood pressure does not appear to be a significant concern among this population.

Data on program participation indicate that families of Head Start children are likely to obtain income, food and medical assistance benefits through AFDC, Food Stamps, WIC and Medicaid. Almost two-thirds participate in three to four of these programs. However, despite likely eligibility, one-third did not participate in Food Stamps and almost 14% did not participate in WIC. Sixteen percent did not receive any assistance benefits at all.

Based on our findings our recommendations are as follows:

- The pediatric portion of the Massachusetts Nutrition Surveillance System should be expanded to include other early childhood programs.

  Surveillance integrated into other early childhood programs such as Early Intervention, Children and Youth, WIC, Growth and Nutrition and Day Care programs would allow for a more comprehensive and representative profile of high-risk children in Massachusetts. Utilization of these existing sources of data is both inexpensive and convenient.

- The Department of Public Health's Office of Nutrition should continue to work with the Head Start program to facilitate the identification, treatment, referral and follow-up of Head Start children at nutritional risk.

  To accomplish this, the Office of Nutrition should continue to enhance nutrition assessment skills of Head Start staff through training and technical assistance, to improve reliable height and weight measurement techniques, to promote access to reliable measuring equipment and to develop Nutrition Counts reports that are timely, informative and easy to use for identification and follow-up of high risk children.

- Programs should be developed which enhance diet quality, ensure access to adequate food, and encourage appropriate levels of physical activity for preschool children and their families.

  Although acute undernutrition is not a significant problem in our target population, overweight, short stature and anemia are prevalent. Educational efforts targeted towards health care providers, parents and teachers must be undertaken to address the impact of poor nutritional practices such as iron deficient diets, inadequate food intake, excessive calories or lack of physical activity on children's health and growth. The Department of Public Health should promote these educational activities.

- Within Head Start, targeted outreach efforts to increase participation in means-tested benefit programs should be undertaken.

  Our findings suggest that a number of Head Start families are not receiving the benefits for which they are eligible. The Office of Nutrition should work with the Administration for Children, Youth and Families Head Start Bureau and local Head Start programs to develop outreach strategies for Head Start families. Local programs can be assisted in utilizing the program participation information collected by their staff to increase the range of benefits obtained by eligible Head Start families.

- Accessible, adequate and appropriate public benefits and nutrition education programs are needed for high risk families in Massachusetts.

  The Department of Public Health should work in conjunction with other agencies to target outreach to assure that financially eligible children receive benefits. Strategies should be developed to improve access to public benefits and nutrition education for high risk families. Outreach to improve access should consider both the adequacy and appropriateness of public benefits and nutrition education programs including such issues as complexity of application procedures, reading level and language of informational materials.

- The Office of Nutrition should work with the Administration for Children, Youth and Families (ACYF) Head Start Bureau to enhance the accuracy of nutrition status measures to be reported in the FY '89 Head Start Program Information Report (PIR).

  In the Spring of 1989, Head Start programs across the United States will be required to report information to ACYF on the numbers of children identified and referred for nutritional risk. The Office of Nutrition should work with ACYF, Head Start programs in Massachusetts and the regional office of the U.S. Department of Health and Human Services (HHS) to develop strategies that enhance the accuracy of nutritional risk information reported on the PIR.

NUTRITION COUNTS

FY88 ANNUAL REPORT

INTRODUCTION

This report presents and discusses the Fall 1987 and Spring 1988 results of Nutrition Counts, the Massachusetts Pediatric Nutrition Surveillance System. The planning, implementation and results of this data collection system will be reviewed and recommendations and directions for the future will be addressed.

Background

The Massachusetts Department of Public Health's 1983 Massachusetts Nutrition Survey identified malnutrition as a significant problem among low-income, preschool children. Of the 1429 children aged 6 months to 6 years included in the survey, almost one in five exhibited some form of malnutrition. In response to this finding, the state legislature mandated the establishment of the Office of Nutrition to develop a statewide surveillance system to monitor nutritionally vulnerable groups in the population. Groups at risk for nutrition-related problems include infants, children, pregnant and lactating women, the elderly, the homeless, participants in emergency food programs and people with a history of chronic disease.

In light of the Massachusetts Department of Public Health's priorities for maternal and child health, the initial phase of the Massachusetts Nutrition Surveillance System targets the pediatric population age 6 years and under. The decision to begin with this population was based on the following factors:

- The pediatric population ages 6 months to 6 years is at high risk for malnutrition as documented by the 1983 Massachusetts Nutrition Survey.

- Preschool children are in a period of rapid growth, making them particularly vulnerable to nutritional insult and responsive to nutritional interventions.

PART I

PROJECT DESCRIPTION AND RESULTS

Goals and Objectives

The primary goal of the pediatric portion of the Massachusetts Nutrition Surveillance System, Nutrition Counts, is to monitor the nutritional status of preschool children in Massachusetts. The objectives of Nutrition Counts include the following:

To describe and monitor the nutritional status of children in the Commonwealth, with particular emphasis on subgroups who are identified as being at risk (e.g. under age 6, low-income, ethnic minority).

To provide early warning data and trend data on the extent of malnutrition and nutrition-related health problems in the Commonwealth.

To provide information on nutrition-related problems to legislators, administrators, and others who are responsible for policy, planning, and program management.

To identify nutrition problems in children served by health, education and/or social service programs in order to facilitate effective program planning, expanded referral systems, and better access to quality care.

To estimate the extent of unmet need for nutrition services in Massachusetts.

To provide local programs with a comprehensive system for identifying nutrition related health problems in specific target groups and monitoring changes in the nutritional status of individuals served.

To provide a research base for investigating relationships among population characteristics (e.g. race, income), program utilization, public policy, nutritional status, health and disease.

To integrate Massachusetts surveillance data within the national Pediatric Nutrition Surveillance System maintained by the Centers for Disease Control.

Planning Phase

In 1986 a nutrition surveillance working group comprised of representatives from the Division of Family Health Services Policy Office, the Office of Nutrition, the Statistics and Evaluation Unit, and Maternal and Child Health programs conducted a pilot study to determine the best sources of pediatric nutritional status data. Nutritional status data were collected for 251 children from two Head Start programs, three community health centers, two licensed group day care centers and two schools in Central Massachusetts. The availability and quality of nutrition status data and the feasibility of data collection were evaluated for each type of site. Refer to Pediatric Pilot of the Massachusetts Nutrition Surveillance System, October 1986, for more information on pilot procedures and results.

Based on the pilot studies, Head Start programs were selected for initial implementation of nutrition surveillance. Head Start programs enroll children from low-income families and routinely collect information needed to monitor nutrition status. Head Start also provides a good environment for preventing nutrition problems as well as identifying and referring children for specialized care. In Massachusetts, 35 Head Start programs serve 7400 low-income children statewide. Children range in age from 2 years and 9 months to six years old.

Implementation

Implementation of Nutrition Counts began in Winter 1987. As an initial step in implementation, the Department of Health and Human Services Administration for Children, Youth and Families (administering agency for Head Start) was informed of the goals and objectives of Nutrition Counts and offered their support of the project.

Recruitment and Sample Size

The Massachusetts Department of Public Health's (MDPH) Office of Nutrition (ON) began recruitment for Nutrition Counts in Spring 1987. Recruitment consisted of an initial letter followed by a meeting with the Head Start Director, Health Coordinator and Nutritionist. During the meeting ON staff described the project in detail and explained the responsibility that participation entailed both for MDPH and for Head Start.

Head Start sites agreed to:

- Submit data forms to the Office of Nutrition.
- Participate in a training session on weighing and measuring.
- Work toward obtaining standard equipment for heights and weights.
- Provide accurate and complete data.

The Office of Nutrition's responsibilities were to:

- Assist sites in obtaining standard equipment.
- Provide a training session on weighing and measuring and data forms.
- Provide timely reports and updates.
- Provide additional nutritional and health information as requested.

Data collection began in Spring 1987 and continued through Spring 1988. Of eleven Head Start programs contacted, ten agreed to participate in Nutrition Counts. Data were submitted as follows:

Spring 1987 and Fall 1987 - Leominster
Worcester

Fall 1987 only - Cape Ann
Fall River
Lawrence
Somerville
Springfield
Taunton
Westfield

Spring 1988 only - Winthrop

Nine more programs plan to join Nutrition Counts in Fall 1988/Spring 1989. These programs are based in Berkshire County, Brockton, Framingham, Greenfield, Holyoke, Lowell, Lynn, Marshfield and New Bedford. It is expected that a total of 19 sites will submit data for 4000 children in FY89.

Training

Each site agreeing to participate in Nutrition Counts received training from ON staff on data collection methods. The training consisted of two sections: anthropometry (weighing and measuring techniques) and growth charts, and use of the Nutrition Counts data form. Participants in the training were Head Start staff or volunteers responsible for weighing and measuring or data collection, as well as the Head Start Health Coordinator and/or the Nutrition Consultant.

1. Anthropometry and Growth Chart training

   a. Goals and objectives

   Since each program would continue to be responsible for measuring the children enrolled in their sites, the goal of the training was to develop consistent and reliable measurement and growth chart techniques among Head Start staff. The objective was to provide uniform information to all sites so that all measurements would be made and recorded using consistent, accurate and reliable techniques and equipment. ON provided Head Start sites with head blocks and tape measures for measuring stature and worked with programs on obtaining accurate scales.

   b. Content

   Trainers reviewed proper weighing and measuring techniques, emphasizing common sources of error and the importance of using reliable equipment. The use of National Center for Health Statistics (NCHS) growth charts was reviewed or explained. In some cases, it was useful to practice plotting measurements or using new measuring equipment.

   c. Training materials

   - U.S Department of Health and Human Services, Guide to Pediatric Weighing and Measuring, 1983
   - National Center for Health Statistics growth charts, 1979
   - Slide tape: University of Washington-Assessment of Children - A Guide to Weighing and Measuring, 1981

2. Data Form training

   a. Goals and Objectives

   The goal of this training was to minimize errors introduced by the large number of people who would be filling out the data forms. The objective was to provide program staff with clear instructions in the use of the data form.

   b. Content

   Nutrition Counts staff demonstrated the proper method for recording data on the form and provided an instruction manual. The data form is a two-page carbon containing 20 coded items. One data form is completed for each child. One copy is kept in the child's record and one is sent to MDPH for data entry. (See Appendix A for copy of data form.)

DATA COLLECTION

Data Items

Basic demographic information, program participation and nutritional status information recorded on the Nutrition Counts data form are the following:

Child's Identification Code
Zip Code
Birthdate
Sex
Race
Ethnicity

Height
Weight
Hemoglobin and/or Hematocrit
FEP and/or Lead (FEP is Free Erythrocyte Protoporphyrin)
Birthweight
Blood Pressure

Program Participation:

Head Start
Family Day Care
Health Center
Special Supplemental Food Program for Women, Infants and Children (WIC)
Early Intervention
Food Stamps
Aid to Families with Dependent Children (AFDC)

Child's Medical Insurance:

Medicaid
Self-Pay
BC/BS (Blue Cross/Blue Shield)
HMO (Health Maintenance Organization)
Other Commercial
Other
Combination

Acute or chronic medical conditions that the child exhibits.

Criteria for Abnormal Values

The following criteria are used in defining nutritional status indicators and assessing the prevalence of abnormal values.

INDICATOR	CUT-OFF VALUE	INTERPRETATION
Low Height for Age	<5th percentile on National Center for Health Statistics (NCHS) Growth Charts	Short stature
Low Weight for Age	<5th percentile on NCHS Growth Charts	Underweight
Low Weight for Height	<5th percentile on NCHS Growth Charts	Underweight
High Weight for Height	>95th percentile on NCHS Growth Charts	Overweight or Obesity
Low Hemoglobin*	<11 grams/dl	Possible iron deficiency anemia
Low Hematocrit*	<34%	Possible iron deficiency anemia
High Free Erythrocyte Protoporphyrin**	>35 ug/dl	Possible iron deficiency and/or lead poisoning
High Lead**	>25 ug/dl	Lead poisoning
High Blood Pressure***	> 110/75	Hypertension

---

* Sources of standards for anemia in preschool children:

- Centers for Disease Control Nutrition Surveillance Summary Report, 1983.
- Head Start Program Performance Standards, 1984.
- Pediatric Nutrition Handbook, 2nd ed., American Academy of Pediatrics, 1985.

** Sources of standards for FEP and LEAD:

- Bellinger, D et al.: Correlates of low level lead exposures in urban children at two years of age. Pediatrics (1986) 77:826-833.
- Kiempe, CH et al., eds.: Current Pediatric Diagnosis and Treatment. Los Altos, CA: Lange Medical Publications, 1984.

*** Source of standards for blood pressure:
The 1984 Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure.

Persons at Head Start Responsible for Data Collection

Head Start programs designated staff who would weigh and measure children, complete data forms, and submit the forms to ON. In most cases, the Health Coordinator was chiefly responsible and was aided by an assistant or by the Nutrition Consultant. Programs with many sites recruited a broader range of staff to work on Nutrition Counts, including classroom teachers and parent advocates.

Timing

Originally ON planned to collect data twice a year, in the fall and spring. The spring collection was later dropped because it was difficult for sites to manage the data collection twice each year. Nine sites submitted data in Fall 1987 and one in Spring 1988. Sites currently agree to submit data once a year. However, they may submit data twice a year if they wish.

Procedure

Federal Head Start regulations state that all programs measure their pupils' statures and weights at least twice a year. The first time is generally in September or October. Health Coordinators or other staff measure children and enter results on children's individual health records. Other health status information obtained from the child's primary care provider is also located in the record. Head Start staff or volunteers copy the pertinent data from children's records onto the Nutrition Counts data form, assigning a unique code to identify each child while protecting confidentiality. The original is sent to the Statistics and Evaluation Unit at MDPH while the carbon copy is retained in the child's file.

DATA ANALYSIS

Review of Data Forms

Forms completed by the Head Start staff were sent to MDPH's Statistics and Evaluation Unit and checked for missing data and coding errors. The amount of time required for this process varied. On the average, 60 to 80 forms were reviewed per hour. Forms submitted by some programs had numerous errors (usually consistent through all the forms) while others had relatively few. Consistent errors were documented for follow-up with programs.

Keypunch

After forms were reviewed, they were batched and sent to Keypunch for entry into a mainframe computer data file. The turnaround time was usually one to two weeks.

Before entering the information, keypunch operators edited the forms for acceptable values (ranges) for each variable. If an unacceptable value was entered, a bell sounded. The keypunch operator would then circle the invalid code and return it, unentered. Approximately 50 forms out of 1700 were not accepted the first time. These forms were usually corrected and hand entered instead of returning to keypunch.

Cleaning Data

After keypunch, the raw data were checked again for errors made either through coding or keypunch. Specific computer programs checked the validity of birthdates, ages, program participation and blood values. Invalid data were corrected whenever possible. For data that could not be corrected, such as missing and incorrect dates or missing sex of child, a special list was printed indicating data errors.

Assigning Percentiles and Z scores to Height and Weight Measurements

Weights, heights, and weight for height were converted to Z scores, which express the child's anthropometric measurements in standard deviation units relative to the fiftieth percentile on reference growth charts. Actual height for age, weight for age, and weight for height percentiles were also calculated for each child.

The Centers for Disease Control (CDC) Anthropometric Software Package (CASP) was used for conversion of anthropometric data (Goldsby, 1972).

Analysis

Analysis was done using the Statistical Analysis System (SAS) package (SAS, 1985). Developing the format for the reports and tables required several weeks. Significant time was needed to adapt report format to include changes made in the Nutrition Counts Data Form since 1987. Once the programs were written to produce report formats, actual descriptive data analysis was very efficient and easily accomplished.

Coordination with Centers for Disease Control

In the fall of 1987, MDPH sent the Spring 1987 surveillance data to the Centers for Disease Control (CDC). The ON was interested in comparing descriptive data analysis conducted by MDPH and CDC. We initially asked CDC to analyze the data but not include it in the national Pediatric Nutrition Surveillance data base.

CDC's principal sources of nutrition surveillance data have been maternal and child health (MCH) programs such as Early and Periodic Screening, Diagnosis and Treatment Program (EPSDT), WIC and Head Start. Currently 39 states besides Massachusetts are submitting nutritional status data on children screened in these programs. CDC provides monthly printouts for each reporting site which list all children who were screened and found to have one or more potentially abnormal values.

Reports are also distributed by CDC quarterly and annually. These reports provide the number of children screened as well as their distribution by age, ethnic group and type of program; prevalence of abnormal conditions; and an estimate of measurement error. In addition, each state receives tables that rank reporting sites by prevalence of short stature, overweight, thinness, and anemia. These reports, as well as annual summaries including information from all states, can be used by states for planning purposes and as a reference for state monitoring systems.

PRESENTATION OF DATA

Content of Reports

Each Head Start program that participated in Nutrition Counts received a report from MDPH's Office of Nutrition tabulating the information submitted. Program summaries and site-by-site tables were included to identify children who are at risk for nutrition related problems and may need further evaluation. Children were listed and identified by code only. A sample report appears in Appendix B.

Timeline

Fall 1987 and Spring 1988 data from ten Head Start programs were received by MDPH between January and July, 1988. Nine reports were mailed out in March 1988. The tenth report was mailed out in late June, and the eleventh was mailed out in late July. The average turnaround time between receipt of data and completion of reports was one to three months. The slow turnaround time was primarily due to the time required to develop the report format. It is anticipated that in the future turnaround time will be approximately four to six weeks.

RESULTS

During FY88 Nutrition Counts received a total of 1727 data forms from 10 Head Start programs. Nine of the Head Start programs submitted data in Fall 1987 and one in Spring 1988. Programs submitted from 58 to 458 forms depending on the size of the program and the number of measurements taken. Data on 105 children from a single program (Lawrence) were removed due to an implausibly high prevalence of underweight. An additional 17 children from the remaining programs were removed because of missing or implausible data. Thus, the results presented in this report are based on a sample of 1605 children from 9 Head Start programs.

The 1605 children included 979 Whites (61.0% of the total), 384 Hispanics (23.9%), 160 Blacks (10.0%), 63 Asians (3.9%), 5 Other (0.3%) and 14 Missing (0.9%) (see Table 1).

Ethnicity was specified in 463 cases. Among these children, 344 were Puerto Rican, 48 Portuguese, 21 Vietnamese, 22 Cambodian, 8 Haitian, 5 Cape Verdean, 5 Chinese, 5 Indian (Asian), and 5 Laotian. Ethnicity was not specified for 1142 children.

In the analysis of the data, the Massachusetts Department of Public Health estimated the prevalence of underweight, overweight, short stature, high blood pressure, low birthweight, chronic health conditions and participation in means-tested benefit programs in this sample of 1605 low-income preschool children. Probable iron deficiency anemia and possible lead poisoning were assessed in 1168 children for whom hematocrit and hemoglobin data were available and 958 children with free erythrocyte protoporphyrin (FEP) or blood lead values.

Anthropometric and Hematological Data

Program by program results as well as statewide totals are shown in Table 2 (Prevalence of low height for age, low weight for height, and high weight for height) and Table 3 (Prevalence of abnormal blood values).

The cutoffs and rationales for abnormal anthropometric and hematological values appeared in a previous section. Briefly, underweight was defined by a measurement less than the 5th percentile of weight for height or weight for age (however we did not use weight for age in our analysis); overweight was defined by being above the 95th percentile of weight for height; and short stature was defined as a height measurement below the 5th percentile of height for age (all percentiles, National Center for Health Statistics). Blood values used to indicate possible iron-deficiency anemia were: hemoglobin below 11 gm/dl, hematocrit below 34%, FEP above 35 ug/dl. High blood lead was set at greater than 25 ug/dl.

In reference standards for anthropometric and hematological data (i.e., NCHS growth charts; standards for anemia), the range of normal values lies between the 5th and 95th percentiles. 90% of a population is expected to fall within this range, 5% at or below the 5th percentile, and 5% at or above the 95th percentile. Excessive prevalence of underweight, overweight, short stature and anemia occurs when greater than 5% of the population falls below the 5th percentile (or above the 95th in the case of overweight). The exact amount of excess is determined by simple subtraction (the expected value of 5% minus the observed value).

By these criteria, 23 children (1.4% of 1605) were underweight by weight for height. Of 1605 children measured, 154 (9.6%) were overweight by weight for height, and 125 (7.8%) exhibited short stature (low height for age).

Because previous studies have shown a correlation between attained height and race, we looked at the distribution of low height for age by race in this sample. We found that among all children who exhibited short stature, 68.8% were White, 6.4% were Black, 7.2% were Asian, and 17.6% were Hispanic. The number and percent of children within each race group with short stature were as follows: among Whites, 86 (8.8%); among Blacks, 8 (5.0%); among Asians, 9 (14.3%); and among Hispanics, 22 (5.7%).

Hemoglobin and/or hematocrit values were reported for 1168 children. Of these, 86 (7.4%) had values below cut-offs for anemia. FEPs (free erythrocyte protoporphyrin) were reported for 823 children; of these, 46 (5.6%) had high values indicating possible iron deficiency anemia and/or lead poisoning. Lead values were reported for 135 children, of whom 33 (24.4%) had values above the cut-off for lead poisoning.

In Nutrition Counts data for FY88, certain anthropometric and hematologic indicators of malnutrition occurred more frequently, and others less frequently, than expected. For example, 9.6% of Nutrition Counts children were overweight, an excess of 4.6% over the expected 5%. Similarly, low height for age (short stature) was observed in 7.8% of the sample, an excess of 2.8%. Conversely, the prevalence of underweight was lower than expected at 1.4%. Probable iron deficiency anemia, according to hematocrit and hemoglobin data, occurred in 7.4% of the sample, an excess of 2.4%. These differences from expected values were each significant at the 0.05 level using X^2 tests for goodness of fit. See Tables 2 and 3.

We were able to estimate the number and proportion of Head Start children who exhibited at least one indicator of malnutrition. Program results and statewide totals are shown in Table 4 (Number and percentage of children exhibiting at least one of the following indicators: low hemoglobin, low hematocrit, low weight for height, low height for age or high weight for height). Of the 1605 children sampled, 351 (21.9%) exhibited at least one indicator of malnutrition. The range for programs was 18.5% to 29.3%.

Because anthropometric data were reported for 1605 children, but hematologic data were available for only 1168 children the results in Table 4 are minimum estimates. The proportion of children within each program for whom hematologic data were not available ranged from zero to 55%. If hematologic data had been available on all children there might have been an increased number of children with low hematocrit or hemoglobin. This would have increased the overall percentage of children with at least one indicator of malnutrition.

Blood Pressures

The American Academy of Pediatrics recommends measuring blood pressures as part of standard health care practice in all children ages 3 and older. The blood pressure cut-off value used in Nutrition Counts is 110/75 (systolic/diastolic) for children under 6 years (NIH, 1984 Report of the Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure). Of the 1174 children with blood pressures reported, 24 (2.0%) exhibited high blood pressure based on these standards.

Birthweight

The standard used for low birthweight (LBW) is less than 2500 grams or 5.5 pounds. In the general U.S. population, 6.8% of births are LBW (DHHS, 1982) and in Massachusetts 5.6% of births are LBW (MDPH, 1986). Of the 1605 children sampled in Nutrition Counts 1454 had birthweights reported. Of these, 102 (7.0%) were considered LBW.

Medical Conditions

We wished to see how many children with low height for age or low weight for height currently or formerly had medical conditions that could account for their small size. Of the 1605 children in our sample, 144 exhibited short stature and/or low weight for height. According to Head Start data, six of these children (4.2%) currently or formerly had medical conditions that might influence growth. The conditions reported were: lead poisoning (two children); cerebral palsy (one child); structural heart disease (one child); total teeth extraction (one child); and "not specified" (one child).

Program Participation

Complete information on program participation was reported for 1596 children out of our total population (1605). Of these, 417 (26.0%) received benefits from all of the following four programs: AFDC, Medicaid, Food Stamps and WIC. 985 (62.0%) reported receiving benefits in three or four programs, the most common pattern being AFDC, Medicaid and Food Stamps. 256 or 16.0% reported no participation in any programs.

Food Stamp income eligibility is based on income at or below 130% of poverty. Head Start income guidelines are 100% of poverty (with the exception of handicapped children who do not need to meet this guideline). It would seem reasonable that many Head Start participants would also be eligible for Food Stamps based on income; in fact, 67% were receiving Food Stamp benefits, a third were not. Participation in AFDC constitutes automatic eligibility for Food Stamps. Seventy-three (7.0%) of the AFDC participants were not receiving Food Stamps.

WIC Eligibility and Nonparticipation

We were able to estimate the number and proportion of Head Start children who probably are eligible for WIC but not participating. We assumed that all Head Start children met the criteria for financial eligibility in WIC which is 185% of the federal poverty line. Using Nutrition Counts cutoffs for underweight, overweight, short stature and anemia, we were able to estimate the number of children under 5 years who met WIC nutritional risk criteria for eligibility but were reportedly not WIC participants (according to Head Start data). We found that 219 children (13.6%) were WIC-eligible nonparticipants. Results are shown in Table 5. Since nutritional risk criteria for WIC eligibility are actually broader than the Nutrition Counts parameters, 13.6% probably underestimates the extent of nonparticipation in WIC by eligible Head Start children.

Table 1

RACE OF NUTRITION COUNTS CHILDREN

Race	#	%
White	979	61.0%
Hispanic	384	23.9%
Black	160	10.0%
Asian	63	3.9%
Missing	14	0.9%
Other	5	0.3%
Total	1605	100%

Source: Office of Nutrition, Health Promotion Sciences, MDPH.

Table 2

PREVALENCE OF LOW HEIGHT FOR AGE, LOW WEIGHT FOR HEIGHT, AND HIGH WEIGHT FOR HEIGHT

Program and State Totals

Program	Number of Children	Low Height for Age # %	Low Weight for Height # %	High Weight for Height # %
Cape Ann	114	6 5.3%	0 0.0%	11 9.6%
Fall River	100	12 12.0%	3 3.0%	4 4.0%
Leominster	332	33 9.9%	6 1.8%	29 8.7%
Somerville	119	6 5.0%	2 1.7%	13 10.9%
Springfield	203	10 4.9%	4 2.0%	18 8.9%
Taunton	119	6 5.0%	1 0.8%	16 13.4%
Westfield	58	2 3.4%	0 0.0%	8 13.8%
Winthrop	102	10 9.8%	2 2.0%	9 8.8%
Worcester	458	40 8.7%	5 1.1%	46 10.0%
TOTAL	1605	125 7.8% *	23 1.4% *	154 9.6%*

* $.02<p<.05$

Source: Office of Nutrition, Health Promotion Sciences, MDPH.

Table 3

PREVALENCE OF ABNORMAL BLOOD VALUES

Program and State Totals

Program	Hematocrit or Hemoglobin			Free Erythrocyte Protoporphyrin			Lead		
	#	Low	%	#	High	%	#	High	%
Cape Ann	105	8	7.6%	8	0	NA*	1	1	NA
Fall River	100	3	3.0%	100	6	6.0%	0	0	NA
Leominster	289	11	3.8%	285	15	5.3%	20	7	NA
Somerville	53	4	7.5%	33	1	NA	12	1	NA
Springfield	139	10	7.2%	23	3	NA	32	17	NA
Taunton	105	7	6.7%	108	1	0.9%	1	0	NA
Westfield	50	9	18.0%	23	3	NA	7	0	NA
Winthrop	48	9	NA	46	7	NA	7	1	NA
Worcester	279	25	9.0%	197	10	5.1%	55	6	10.9%
TOTAL	1168	86	7.4% **	823	46	5.6%	135	33	24.4%

* NA = Not Applicable. Percentage calculations were omitted for samples of fewer than 50 children.

** $.025<p<.05$

Source: Office of Nutrition, Health Promotion Sciences, MDPH.

Table 4

NUMBER AND PERCENTAGE OF CHILDREN EXHIBITING AT LEAST ONE OF THE FOLLOWING INDICATORS: LOW HEMOGLOBIN, LOW HEMATOCRIT, LOW WEIGHT FOR HEIGHT, LOW HEIGHT FOR AGE OR HIGH WEIGHT FOR HEIGHT*

Program and State Totals

Program	Total Children	#	%
Cape Ann	114	24	21.1%
Fall River	100	21	21.0%
Leominster	332	69	20.8%
Somerville	119	22	18.5%
Springfield	203	40	19.7%
Taunton	119	28	23.5%
Westfield	58	17	29.3%
Winthrop	102	27	26.5%
Worcester	458	103	22.5%
TOTAL	1605	351	21.9%

Source: Office of Nutrition, Health Promotion Sciences, MDPH.

* Numbers and percentages listed above are minimum estimates of children with at least one indicator of malnutrition. See page 14.

Table 5

CHILDREN ELIGIBLE FOR WIC BENEFITS BUT NOT PARTICIPATING

Program and State Totals

Program	Total children	Number of Eligible* Non-participants	% of Children in Program
Cape Ann	114	10	8.8%
Fall River	100	0	0.0%
Leominster	332	32	9.6%
Somerville	119	11	9.2%
Springfield	203	36	17.7%
Taunton	119	7	5.9%
Westfield	58	6	10.3%
Winthrop	102	24	23.5%
Worcester	458	93	20.3%
TOTAL	1605	219	13.6%

Source: Office of Nutrition, Health Promotion Sciences, MDPH.

* Number of children in program under 5 years with at least one nutritional risk factor. It is assumed that all Head Start children meet the income eligibility criteria for WIC. These are minimum estimates of children with at least one indicator of malnutrition (as discussed on page 14).

PART II

PROJECT EVALUATION AND DISCUSSION

EVALUATION

Recruitment

The overall strategy for recruiting Head Start programs into Nutrition Counts has been highly successful. Out of eleven programs contacted for Fall 1987/Spring 1988 data collection, ten agreed to participate. An additional nine out of twelve programs that ON staff contacted in Spring 1988 have agreed to begin data collection in Fall 1988/Spring 1988.

Training

Evaluation forms completed by Head Start staff indicated that the anthropometry training adequately prepared staff for measuring the children and improved the measuring skills of staff in most cases.

Some respondents thought that the written training materials could have been made more useful. We received one comment that the training could have been more specific to the functional level of the trainees, although it was unclear whether this meant the training was pitched too high or too low. There were several instances where trainees found the slide tape redundant or slow. ON is seeking alternative audio-visual material.

Some Head Start staff felt that the training in the use of the data form did not fully prepare them for filling out the forms. Furthermore, some thought the instruction manual could have been clearer. In response to these comments, amendments to the manual have been made planned and trainers now have Head Start staff complete sample data forms during the training.

Data Collection

We received several comments on the implementation of the measuring techniques. While one site commented that the precision and accuracy we required added time to the procedure, others appreciated the head blocks and tape measures.

Evaluations and comments during data collection indicated that some programs had problems with the data forms. The forms took more time to complete than Head Start staff expected. Sites reported spending 5 to 15 minutes on each form, depending on whether they had problems finding specific data, particularly birthweights and lab values for blood tests. In some cases physicians had carried out the blood tests and had omitted values in their reports to Head Start; instead, they had simply indicated whether a result was normal or abnormal. This meant that the Head Start program spent time trying to contact the physician for a specific blood value. ON is looking into this issue.

There was some confusion with the data form about race and ethnicity classification. Questions about the "correct" race choice for Hispanic children were common. ON has prepared new instructions for completing the race and ethnicity items.

Data Analysis

Common problems encountered with data forms included the following:

1. Missing information -- sex of child; race of child.
2. Incorrect data -- birthdate (current year recorded instead of birth year); measurement date incorrect.
3. Reversed or transposed hematocrit and hemoglobin results; reversed or transposed FEP and lead results.
4. Zero fill of boxes -- wrote numbers without realizing boxes across might represent hundreds, tens, ones, etc.
5. Boxes left blank where a number was required.
6. More than one number entered in a box; i.e., fractions put in one box or numbers greater than 9 put in one box.

Staff completing forms may require more training to understand how keypunch and computers look at and interpret forms. Such training would reinforce the need to follow instructions that are very specific in order to avoid errors resulting from individual interpretation.

Presentation of Data

In general, feedback from Head Start programs regarding the content and usefulness of the Nutrition Counts report was favorable. However, the application and content of three tables require further clarification. These tables were:

WIC nonparticipants with risk factors

Appendix A: Children with missing sex or age

Appendix B: Children with missing Height or Weight or who have Height or Weight values out of Age range.

These tables and the explanatory notes accompanying them will be revised for next year.

Usefulness of Data

Programs indicated they would use the reports for the following:

- Follow-up on individual children
- Developing nutrition plans
- Parent education
- Completing required program reports
- Teacher and staff education
- As a double-check for referral and follow-up of individual children

The usefulness of the report with regard to improving follow-up on individual children was limited by the length of the turnaround time. Sites began weighing and measuring in September and data were submitted beginning in January. However, reports were not mailed out until April. By that time, follow-up and referral were already completed. There were several reasons for this timeline. First, sites needed to wait for mid-year blood tests to be carried out before they submitted forms; furthermore, time had to be set aside for filling out the forms. For large sites this might have caused a significant delay. Once MDPH received the forms, modifications that were needed in the report format delayed production of the final report. A satisfactory format is now prepared that will reduce turnaround time once MDPH receives the forms to four to six weeks in FY89.

DISCUSSION

Anthropometry and Hematology

Anthropometric and hematological results from Nutrition Counts indicate that short stature, overweight, and anemia are more frequent among low income Head Start preschoolers than in reference populations. Furthermore, greater than one in five children exhibited at least one indicator of malnutrition (underweight, overweight, short stature, or anemia). When overweight was excluded, greater than one in six children had one or more indicators of undernutrition (underweight, short stature, and anemia).

In interpreting these results their reliability and validity must be considered. One aspect of reliability is consistency among studies. In fact, findings from Nutrition Counts are consistent with those of the 1983 Massachusetts Nutrition Survey as well as the Centers for Disease Control Nutrition Surveillance Annual Summary (1983). Both have shown that overweight, short stature, and anemia occur frequently among low-income preschool children. Actual prevalence values differ among these surveys, however. A comparison and review of methods, potential biases, and confounding factors that could account for differences in results from Nutrition Counts and the Massachusetts Nutrition Survey is underway at MDPH (Wiecha, 1988).

Errors can reduce reliability and certainly could have influenced the results in Nutrition Counts. Errors could have occurred when children were measured or when these values were recorded or entered into the computer. MDPH was able to remove biologically implausible values from the analysis; however, plausible but incorrect values cannot be identified or removed.

Numerous biological and social factors may affect nutritional status (Rathbun, 1987). We obtained information on birthweight and medical conditions in our sample.

Low birthweight (less than 5.5 pounds), especially due to symmetric intrauterine growth retardation, may affect stature throughout infancy, childhood and even adolescence (Fitzhardinge, 1972; Bech, 1975; Villar, 1982; Gayle, 1987). Head Start programs reported that 7.0% of children in the sample had low birthweights as compared to 5.6% in Massachusetts (MDPH, 1986) and 6.8% in the US (DHHS, 1982). Because these rates are slightly different, they suggest that low birthweight may have had a small effect on our estimate that chronic undernutrition resulting in short stature occurred in 7.8% of Head Start children. Further analysis of the relationship between LBW and short stature in Nutrition Counts is warranted to determine if short stature was more prevalent in LBW children compared to others.

Certain medical conditions may affect physical growth. We collected data on acute and chronic conditions that may elevate nutrient requirements or limit nutritional intake (see Appendix A). Only six of the 143 children who were underweight (low weight for height) or had short stature (low height for age) also had a medical condition (4.2%). Thus, this potential association of reported medical conditions was not likely to be significant in our sample.

Participation in Head Start may also affect nutritional status because the program provides nutritious meals and snacks to children as well as nutrition education for staff, parents and children. This could cause our prevalence estimates to be lower than they might be among other low income preschool children, and in fact may limit our ability to generalize from our results to other groups. At present we are unable to control for this factor because we do not collect information on duration of Head Start participation or comparison data on children not participating in Head Start.

Despite these caveats and potential problems, our findings mirrored other results from similar populations. However, because of the unknown effect of Head Start participation itself, we caution against using Nutrition Counts prevalence estimates to extrapolate numbers of malnourished children in other low income preschool populations since these populations may not be comparable.

Program Participation

Data on program participation indicate that families of Head Start children are likely to obtain income, food, and medical assistance benefits through AFDC, Food Stamps, WIC and Medicaid. Two-thirds participated in three to four of these programs. However, almost one third of sample households did not participate in food stamps, about 14% of Head Start children did not receive WIC (even though they appeared to be at nutritional risk), and 16% did not receive any benefits at all (from AFDC, Food Stamps, WIC or Medicaid).

While Nutrition Counts data suggest that most households in the sample utilize benefit programs, the generalizability of this result to other households is questionable. Households participating in Head Start may be more likely to access government benefits than other households, and are sometimes referred to other programs by Head Start staff. Therefore, our results probably overestimate participation by low-income households in the government assistance programs studied.

Implications

FY88 Nutrition Counts findings suggest that thinness, often a reflection of acute undernutrition, does not appear to be a major public health concern among this population. The excessive prevalence of short stature, overweight and anemia, however, suggests that both chronic undernutrition and overnutrition are significant, though paradoxical, problems in this population, and that diets low in absorbable iron are also of concern. In addressing the nutritional problems of this population, consideration should be given to diet quality and physical activity as well as to calorie requirements.

Data on program participation indicate that some families who are eligible for assistance programs are not receiving benefits. Many studies and reports have shown that non-participation among eligibles is often due to lack of knowledge or understanding about programs. This suggests that targeted oureach efforts within Head Start could help a modest number of low income households access benefits for which they are eligible.

The ability of a low-income family to access or choose nutritionally appropriate foods is an important determinant of nutritional status. This ability may stem from factors such as economics, culture, food preferences, and education. Public benefits and nutrition education programs that are accessible, adequate and appropriate are needed to address the impact that poverty and poor nutritional practices may have on children's health.

Conclusion

The primary goal of Nutrition Counts is to monitor the nutritional status of preschool children in Massachusetts. Because it will be several years before we have enough data to describe the nutritional status of this population over time, we can only evaluate whether we have established a solid data base to use as a starting point in future analyses.

In FY88 the primary objective of Nutrition Counts, which was to describe the nutritional status of certain high risk children in the Commonwealth, was met. In addition, we were able to describe the use of public benefit programs and to estimate the extent of nonparticipation in specific programs as a proxy for unmet need. Furthermore, a system was developed which allowed us to provide Head Start programs with information identifying children with nutrition related health problems. In addition, a reliable research base for investigating important issues in public health nutrition was also developed. Finally, the data collected by Head Start programs around the state enables Massachusetts to be involved in the federal Centers for Disease Control Pediatric Nutrition Surveillance System.

These objectives were accomplished by utilizing sensitive, easily understood nutrition status measures and existing programs, personnel and sources of data. Thus, Nutrition Counts is an efficient surveillance project that in the future will enable us to monitor the prevalence of malnutrition over time.

Overall, Nutrition Counts provides MDPH, legislators, and others with important local data on nutritional problems in the state that will be useful in policy development and program planning. Vital public health initiatives such as the Children and Youth, Early Intervention, and Growth and Nutrition programs as well as the Surveillance of Severe Pediatric Undernutrition project will be able to refer to and use Nutrition Counts data with confidence.

RECOMMENDATIONS

The following recommendations and rationales are based on the results of FY88 Nutrition Counts:

- The pediatric portion of the Massachusetts Nutrition Surveillance System should be expanded to include other early childhood programs.

  Surveillance integrated into other early childhood programs such as Early Intervention, Children and Youth, WIC, Growth and Nutrition and Day Care programs would allow for a more comprehensive and representative profile of high-risk children in Massachusetts. Utilization of these existing sources of data is both inexpensive and convenient.

- The Department of Public Health's Office of Nutrition should continue to work with the Head Start program to facilitate the identification, treatment, referral and follow-up of Head Start children at nutritional risk.

  To accomplish this, the Office of Nutrition should continue to enhance nutrition assessment skills of Head Start staff through training and technical assistance, to improve reliable height and weight measurement technique, to promote access to reliable measuring equipment and to develop Nutrition Counts reports that are timely, informative and easy to use for identification and follow-up of high risk children.

- Programs should be developed which enhance diet quality, ensure access to adequate food, and encourage appropriate levels of physical activity for preschool children and their families.

  Although acute undernutrition is not a significant problem in our target population, overweight, short stature and anemia are prevalent. Educational efforts targeted towards health care providers, parents and teachers must be undertaken to address the impact of poor nutritional practices such as iron deficient diets, inadequate food intake, excessive calories or lack of physical activity on children's health and growth. The Department of Public Health should promote these educational activities.

- Within Head Start, targeted outreach efforts to increase participation in means-tested benefit programs should be undertaken.

  Our findings suggest that a number of Head Start families are not receiving the benefits for which they are eligible. The Office of Nutrition should work with the Administration for Children, Youth and Families Head Start Bureau and local Head Start programs to develop outreach strategies for Head Start families. Local programs can be assisted in utilizing the program participation information collected by their staff to increase the range of benefits obtained by eligible Head Start families.

- Accessible, adequate and appropriate public benefits and nutrition education programs are needed for high risk families in Massachusetts.

  The Department of Public Health should work in conjunction with other agencies to target outreach to assure that financially eligible children receive benefits. Strategies should be developed to improve access to public benefits and nutrition education for high risk families. Outreach to improve access should consider both the adequacy and appropriateness of public benefits and nutrition education programs including such issues as complexity of application procedures, reading level and language of informational materials.

- The Office of Nutrition should work with the Administration for Children, Youth and Families (ACYF) Head Start Bureau to enhance the accuracy of nutrition status measures to be reported in the FY '89 Head Start Program Information Report (PIR).

  In the Spring of 1989, Head Start programs across the United States will be required to report information to ACYF on the numbers of children identified and referred for nutritional risk. The Office of Nutrition should work with ACYF, Head Start programs in Massachusetts, and the regional office of the U.S. Department of Health and Human Services (HHS) to develop strategies that enhance the accuracy of nutritional risk information reported on the PIR.

LITERATURE CITED

1983 Massachusetts Nutrition Survey. Division of Family Health Services, Massachusetts Department of Public Health. Boston: October, 1983.

Pediatric Pilot of the Massachusetts Nutrition Surveillance System: Analysis and Recommendations. Massachusetts Department of Public Health. Boston: October, 1986.

US Department of Health and Human Services. *1984 Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure*. NIH Publication No. 84-1088. National Institutes of Health, September 1984.

Centers for Disease Control: Nutrition Surveillance 1983. Issued August 1985.

Fitzhardinge PM, Steven EM. The small-for-date infant: I. Later growth patterns. *Pediatrics* 1972; 49:671-681.

Bech GJ, van de Berg BJ: The relationship of the rate of intrauterine growth of low birthweight infants to later growth. *J. Pediatrics* 1975; 86:504-511.

Villar J, Belizian JM, Spaulding J et al.: Post-natal growth of intrauterine growth retarded infants. *Early Human Dev* 1982; 6:265-0271.

Gayle HD, Dibley MJ, Marks JS, Trowbridge FL: Malnutrition in the first two years of life. *AJDC* 1987; 141:531-534.

Goldsby JB. Pctl19d anthropometry Fortran subroutines. Atlanta: Centers for Disease Control, Nutrition Division, Health Promotion and Education, 1972.

SAS Institute, Inc. SAS User's Guide: Basic's Version 5 Edition. Cary, NC: SAS Institute, 1985.

Wiecha JL, Walsh CB, Grandon CA, Peterson KE, Fisher-Miller P, Palombo R. Prevalence of pediatric malnutrition in Massachusetts. Abstract and persentation, American Public Health Association Meetings, Boston, November 1988.

Rathbun JM, Peterson KE. Nutrition in failure to thrive. In: Grand FJ, Sutphen JL, Dietz WH (eds.): Pediatric Nutrition. Boston: Butterworths, 1987.

APPENDICES

A. Nutrition Counts data form

B. Sample Nutrition Counts report

Appendix A

MA8S03

NUTRITION COUNTS

Pediatric Health and Nutrition Data Form

SITE ☐☐☐ TOWN ☐☐☐

MDPH 8/87

1. CHILD IDENTIFICATION
   a. enter first 3 letters of last name 1.a ☐☐☐
   b. enter child code or record number b ☐☐☐☐☐☐☐☐☐

2. ZIP CODE 2. ☐☐☐☐☐

3. DATE OF BIRTH 3. ☐☐/☐☐/☐☐

4. SEX M or F 4. ☐

5. RACE 1=White 2=Black 3=Asian 4=Other (specify)____________ 5. ☐

6. ETHNIC ORIGIN 6. ☐☐
   01=Haitian 04=Cape Verdean 07=Vietnamese
   02=Puerto Rican 05=Portuguese 08=Cambodian
   03=Other Hispanic 06=Chinese 09=Laotian
   (specify)____________ 10=Other(specify) ____________

7. DATE OF HEIGHT/WEIGHT MEASUREMENT 7. ☐☐/☐☐/☐☐

8. HEIGHT ☐☐☐.☐ cms or ☐☐ inches ☐/8ths

9. WEIGHT ☐☐☐☐☐ grams or ☐☐ lbs ☐/4ths

10. DATE OF BLOOD TEST (most recent) 10. ☐☐/☐☐/☐☐

11. HEMOGLOBIN (gm/100 ml) 11. ☐☐☐.☐
    OR
12. HEMATOCRIT (percent) 12. ☐☐

13. DATE OF FEP and/or LEAD (most recent) 13. ☐☐/☐☐/☐☐

14. FEP ☐☐☐ ug/dl 15. LEAD ☐☐☐ ug/dl

16. BIRTHWEIGHT ☐☐☐☐ grams or ☐☐ lbs ☐☐ oz

17. BLOOD PRESSURE ☐☐☐/☐☐☐ (systolic/diastolic)

18. PROGRAM PARTICIPATION (Current Status) 1=yes 0=no 9=unknown

☐ a. Head Start
☐ b. Family Day Care
☐ c. Center-based Day Care
☐ d. Health Center
☐ e. WIC
☐ f. Early Intervention
☐ g. Food Stamps
☐ h. AFDC

19. CHILD'S MEDICAL INSURANCE 19. ☐
    1=Medicaid 4=HMO 7=Combination
    2=Self Pay 5=Other Commercial ____________
    3=BC/BS 6=Other 9=unknown

20.a. In your opinion, does this child have a medical condition that might affect his/her height or weight or general nutritional status? 1=yes 0=no 9=don't know 20.a ☐

20.b. If yes, please circle the number of the acute or chronic condition below which the child has exhibited: 20.b ☐☐ DPH USE ONLY

ACUTE CONDITIONS (present only)
01=Diarrhea or vomiting for over 24 hours
02=Dehydration
03=Anorexia
04=Acute respiratory distress

CHRONIC CONDITIONS (past or present)
05=Amputation or congenital limb absence (digits excepted)
06=Cancer
07=Chromosomal abnormality
08=Chronic diarrhea, Crohn's, ulcerative colitis, celiac
09=Cleft palate
10=Cystic fibrosis, bronchopulmonary dysplasia
11=Sickle cell, thalassemia, any other blood disorder (except anemia)
12=Dwarfing conditions
13=Endocrine disease
14=Renal disease that requires special diet or medicine
15=Severe cerebral palsy or severe mental retardation
16=Structural heart disease
17=Failure to thrive
18=Appliance or cast
19=Anorexia nervosa/bulimia
20=Other, please specify
____

Appendix B
Sample Report*

NUTRITION COUNTS REPORT
Program Name

Table of Contents

Title & Site | Page

- Summary information - Percentage of Children with Out of Range Weight/Age, Height/Age, Weight/Height Hematocrit (Hct), Hemoglobin (Hgb), Free Erythrocyte Protoporphyrin (FEP), and Lead......................
- Table 1: Children in Head Start Program as of Fall 1987, Measurements Taken at the Program
  - Site Name ....
  - Site Name ....
  - Site Name ....
- Table 2: Children with Weight/Age or Height/Age or Weight/Height Below the 5th Percentile
  - Site Name ....
  - Site Name ....
  - Site Name ....
- Table 3: Children with Weight/Height Above the 95th Percentile
  - Site Name ....
  - Site Name ....
  - Site Name ....
- Table 4: Children with Blood Pressure (BP) Above Normal, Hematocrit (Hct) or Hemoglobin (Hgb) below Normal, Lead or FEP Above Normal Levels
  - Site Name ....
  - Site Name ....
- Children with Nutritional Risk Indicator(s) Who do not Participate in WIC...
- Appendix B: Children with Missing Height or Weight Values, or who have Height or Weight Values out of Age Range.
  - Site Name ....
  - Site Name ....
  - Site Name ....

---

* This report is a compilation of tables from different Head Start programs and does not represent results from one program. Therefore, inconsistencies between tables may result.

SUMMARY INFORMATION

Summary information appears on the next four pages.

The information below is tabulated on the facing page. The number appearing in the "Total Kids" column may be less than the number of data forms you submitted. This is because some children were excluded from analysis due to specific problems with their data. See Appendices A and B for lists of these children and the reasons they were excluded.

Follow-up is recommended for the following indicators:

LOW WEIGHT/AGE - 4 (3.4%) of the children in your program were identified as being below the 5th percentile for weight/age.

Significance - This may indicate that these children may be chronically underweight or have recently lost weight due to inadequate nutritional intake or a medical condition.

LOW HEIGHT/AGE - 6 (5.0%) of the children in your program were identified as being below the 5th percentile for height/age.

Significance - This may indicate that these children are chronically malnourished or have a medical condition which can result in growth stunting.

LOW WEIGHT/HEIGHT - 2 (1.7%) of the children in your program were identified as being below the 5th percentile for weight/height.

Significance - This may indicate that these children may be chronically underweight or have recently lost weight due to inadequate nutritional intake or a medical condition.

HIGH WEIGHT/HEIGHT- 13 (10.9%) of the total children in your program were identified as being above the 95th percentile for weight/height.

Significance - This may indicate that these children are overweight and may require further assessment.

Note: Children identified for the above risk indicators may be exhibiting growth patterns which may be normal for that individual; however, further assessment is recommended.

```
                      FREQUENCIES BY PROGRAM
             PERCENTAGE OF CHILDREN WITH OUT OF RANGE
               WEIGHT/AGE HEIGHT/AGE WEIGHT/HEIGHT

                TOTAL     LOW       LOW       LOW       HIGH
 PROGRAM        KIDS      WT/AGE    HT/AGE    WT/HT     WT/HT
 *******        *****     ******    ******    ******    ******
Site Name         39        2         1         1         4
                          5.1%      2.6%      2.6%     10.3%

Site Name         28        1         2                   4
                          3.6%      7.1%         %     14.3%

Site Name         52        1         3         1         5
                          1.9%      5.8%      1.9%      9.6%

--------------------------------------------------------------
 TOTALS:         119        4         6         2        13
                          3.4%      5.0%      1.7%     10.9%
```

The information below is tabulated on the facing page.

LOW HCT LOW HGB - You reported these iron status measures for 55 children in your program. 4 (7.3%) of these children exhibited HCT levels below 34% and/or HGB below 11 gm/100 ml, indicating possible anemia.

Significance - Most cases of anemia are caused by diets that are low in iron. Sometimes anemia may be caused by internal bleeding, malabsorption, certain genetic conditions or disease. The child should be referred to a pediatrician or clinic.

HIGH BLOOD FEP - You reported FEPs for 33 children in your program. 1 of these children exhibited blood FEP levels above 35 micrograms/deciliter.

Significance - A high blood FEP level indicates that the child may have lead poisoning. High FEP can also be caused by iron deficiency anemia. The child should be referred for further blood tests to confirm results.

HIGH BLOOD LEAD - You reported LEADS for 12 children in your program. 1 of these children exhibited blood lead levels above 25 micrograms per/deciliter.

Significance - When a child's blood lead level is equal to or above 25 ug/dl, the child has lead poisoning and must be referred to a pediatrician for treatment. Children testing positive should have their blood tested frequently for at least a year.

BLOOD VALUES BY SITE

Site	HCT or HGB N*	 LOW	FEP N	 HIGH	LEAD N	 HIGH
Site Name	19	1	9	1	9	1
Site Name	12	3	6	0	2	0
Site Name	24	0	18	0	1	0
Totals:	55	4	33	1	12	1
	7.3 %**		NA %		NA %	

* = Number of measurements reported.

** = Low values as a percent of the number of measurements reported. No percentages were calculated if fewer than 50 measurements were reported.

0836N

Title

Table 1: Children in Head Start Program as of Fall 1987, Measurements Taken at the Program.

Definitions

Child Id = Child Identification Number. The three letters at the beginning of the Child Id are the first three letters of the child's last name. This is followed by the unique number you assigned to each child in your program before completing the Nutrition Counts data form.

Ht/Age %tile = Height/Age Percentile when plotted on a standard growth chart.

Wt/Age %tile= Weight/Age Percentile when plotted on a standard growth chart.

Wt/Ht %tile= Weight/Height Percentile when plotted on a standard growth chart.

Hct = Hematocrit

Hgb = Hemoglobin

FEP = Free Erythrocyte Protoporphyrin

Medic Cond = Medical Condition. If you noted that a child had a medical condition which might influence his or her weight, a "yes" will appear in this column. The specific acute or chronic condition you specified will be listed in the next column ("acute/chronic").

Explanation

Table 1 shows all of the data you submitted on the Nutrition Counts forms. Percentiles have been calculated for each child. Any child whose data form was missing information on sex, age, height or weight is not included and appears on a separate list. See Appendix A.

Note that any percentile greater than 95 (e.g. 95, 96, 97, 98, 99, 100 or greater) will appear as "96.0".

Note that any percentile less than 5 (e.g. 5, 4, 3, 2, 1 or less) will appear as "4.0".

Missing values appear either as a dot (.) or a dash (-).

TABLE 1　　PAGE 1 OF 2

CHILDREN IN HEADSTART PROGRAM FALL/WINTER 87/88

MEASUREMENTS TAKEN AT THE PROGRAM

PROGRAM=

CHILD ID	SEX	RACE ETHNICITY	AGE MOS	HEIGHT INS 8THS	HT/AGE %TILE	WEIGHT LBS 4THS	WT/AGE %TILE	WT/HT %TILE	BLOOD PRESSURE	HCT	HGB	FEP	LEAD	BIRTHWT LBS OZS	MEDIC COND		ACUTE CHRONIC
ALMPOPE202	M	WHITE	35	36-2/8	22.5	27-0/4	7.1	12.8	086/048	.	14.0	.	17	05-02/16	NO		.
ARDPOPE101	M	WHITE	45	44-4/8	96.0	45-3/4	96.0	71.5	076/042	37	.	.	.	09-04/16	NO		.
BERPOPE203	F	WHITE	50	41-2/8	66.6	39-0/4	71.5	72.6	094/048	18	.	.	20	08-02/16	NO		.
BOUPOPE102	M	HAITIAN	54	46-0/8	96.0	47-2/4	93.7	59.3	080/052	38	12.8	.	18	08-03/16	NO		.
BURPOPE204	F	WHITE	39	41-0/8	96.0	36-0/4	77.2	45.4	/	.	.	.	.	07-06/16	DK		.
CAMPOPE205	F	WHITE	54	43-0/8	81.7	43-0/4	84.0	79.2	/	.	.	.	.	08-02/16	DK		.
CERPOPE103	M	WHITE	53	42-4/8	65.4	38-2/4	47.7	36.6	078/062	.	.	.	.	06-13/16	YES		.
COUPOPE120	F	WHITE	37	37-6/8	61.1	31-2/4	50.2	48.5	086/040	.	.	.	.	07-00/16	DK		.
COUPOPE221	F	PORTUG	59	41-2/8	23.2	35-0/4	19.9	29.6	090/050	.	.	.	.	06-01/16	OK		.
COYPOPE105	F	WHITE	40	36-2/8	9.2	31-0/4	30.5	68.9	070/049	.	.	.	.	06-12/16	NO		.
DBRPOPE112	F	WHITE	32	35-2/8	28.8	24-2/4	4.0	6.9	079/042	36	.	62	12	05-15/16	NO		.
DEAPOPE206	M	WHITE	3	39-2/8	96.0	35-1/4	96.0	69.7	064/040	.	.	.	.	06-04/16	DK		.
DEPPOPE207	M	WHITE	47	41-0/8	65.0	40-0/4	78.2	78.1	080/060	.	12.2	25	.	04-09/16	NO		.
DESPOPE106	M	PORTUG	36	36-6/8	30.6	29-2/4	21.8	33.5	/	.	.	.	.	07-01/16	DK		.
DINPOPE104	F	PORTUG	51	45-4/8	96.0	67-1/4	96.0	96.0	120/080	.	.	.	.	- /16	YES	OTHER	
DIRPOPE209	F	HAITIAN	50	43-4/8	96.0	41-1/4	82.7	56.5	090/060	.	.	.	.	06-00/16	DK		.
DUMPOPE210	M	HAITIAN	44	41-4/8	85.6	38-1/4	73.9	52.2	/	37	.	.	.	- /16	DK		.
DUTPOPE108	F	PORTUG	30	36-6/8	76.4	34-2/4	92.4	90.3	074/030	.	.	.	.	08-10/16	DK		.
FRAPOPE109	M	WHITE	36	40-2/8	93.7	51-0/4	96.0	96.0	090/072	39	.	.	39	08-12/16	YES	OTHER	
GASPOPE211	M	WHITE	33	38-0/8	79.6	35-1/4	83.7	78.3	/	.	.	24	.	05-03/16	DK		.
GRAPOPE212	M	WHITE	43	40-0/8	61.7	36-1/4	58.8	57.4	/	.	.	.	.	08-05/16	DK		.
GUEPOPE121	F	BLACK	39	40-0/8	91.8	34-0/4	63.7	39.8	080/060	57	17.8	.	21	- /16	NO		.
HARPOPE222	M	WHITE	35	36-0/8	20.8	31-0/4	40.3	64.9	072/038	.	.	12	.	06-03/16	DK		.
LAVPOPE217	M	WHITE	50	42-6/8	82.0	39-2/4	64.6	42.6	078/040	37	.	28	.	07-02/16	NO		.
LEOPOPE110	M	WHITE	35	37-0/8	44.4	26-2/4	5.4	4.0	/	39	12.8	.	19	06-02/16	NO		.
LUPPOPE213	F	WHITE	37	34-6/8	4.0	26-0/4	4.0	29.1	082/050	.	.	.	.	- /16	DK		.
MARPOPE214	M	WHITE	50	44-2/8	96.0	54-0/4	96.0	96.0	098/060	.	.	.	.	07-05/16	DK		.
MARPOPE218	F	PORTUG	53	41-0/8	44.9	39-2/4	67.8	79.1	092/042	.	.	.	.	- /16	OK		.
MCMPOPE216	F	WHITE	54	44-0/8	93.1	39-2/4	65.0	29.9	090/070	34	.	.	.	08-03/16	DK		.
MERPOPE215	F	WHITE	45	38-0/8	18.8	31-0/4	18.0	38.1	/	36	.	20	.	05-06/16	OK		.
NIXPOPE111	M	WHITE	44	39-0/8	32.6	38-0/4	70.8	85.5	060/042	38	13.4	.	22	08-08/16	NO		.
NOEPOPE220	M	WHITE	58	44-2/8	78.9	46-1/4	86.8	79.1	100/070	.	.	27	.	07-06/16	DK		.
PEDPOPE113	M	WHITE	42	36-6/8	6.9	33-1/4	35.8	77.6	072/050	41	.	16	.	07-09/16	NO		.
POMPOPE219	M	BLACK	35	39-2/8	88.9	34-1/4	70.8	47.9	/	35	.	34	.	07-01/16	NO		.
RONPOPE114	M	WHITE	36	37-6/8	52.6	31-3/4	41.1	44.3	080/044	.	.	.	.	07-12/16	DK		.
RUSPOPE115	M	WHITE	56	43-2/8	68.1	44-0/4	80.2	77.6	080/052	37	.	.	.	- /16	OK		.
SPIPOPE116	M	WHITE	58	42-0/8	32.0	41-2/4	57.1	76.5	078/060	40	.	.	.	06-10/16	DK		.
STOPOPE117	M	WHITE	45	39-2/8	36.9	37-1/4	63.3	78.8	060/042	.	.	.	.	04-09/16	DK		.
THEPOPE118	F	HAITIAN	36	37-2/8	51.3	31-0/4	46.3	51.8	076/050	39	.	.	23	07-06/16	NO		.
WOOPOPE119	M	WHITE	49	43-6/8	96.0	54-0/4	96.0	96.0	090/070	.	.	.	.	08-05/16	YES	OTHER	

Title

Table 2: Children with Weight/Age or Height/Age or Weight/Height Below the Fifth Percentile.

Definitions

See definitions for Table 1

Explanation

Table 2 flags all children who may be at nutritional risk due to small size (i.e. low weight/age, low height/age, or low weight/height).

If no Table 2 appears for a particular site, then that site had no children with these risk indicators.

Note that an * indicates a measurement below the fifth percentile. Any percentile less than 5 (e.g. 5, 4, 3, 2, 1 or less) will appear as "4*".

Children listed in this table should receive follow-up according to Head Start guidelines.

TABLE 2
CHILDREN WITH WT/AGE OR HT/AGE OR WT/HT BELOW THE FIFTH PERCENTILE

AN * INDICATES A MEASUREMENT BELOW THE FIFTH PERCENTILE

PROGRAM=

CHILD ID	AGE MOS	SEX	HEIGHT INS 8THS	HT/AGE %TILE	WEIGHT LBS 4THS	WT/AGE %TILE	WT/HT %TILE	MEDIC COND	ACUTE CHRONIC
DBRPOPE112	32**	F	35-2/8	28.8	24-2/4	4*	6.9	NO	.
LEOPOPE110	35	M	37-0/8	44.4	26-2/4	5.4	4*	NO	.
LUPPOPE213	37	F	34-6/8	4*	26-0/4	4*	29.1	DK	.

Title

Table 3: Children with Weight/Height Above the 95th Percentile or
Children Whose Age is Less Than 2.9 Years.

Definitions

See definitions for Table 1.

Explanation

Table 3 flags two groups of children:

- All children whose age is less than 2.9 years according to the data form submitted to Nutrition Counts. Most likely these ages are in error and if so, percentiles listed are invalid. Ages for these children at the time of measurement should be checked before utilizing the information on growth percentiles.

  Note that two ** indicate that age of child is less than 2.9 years according to data form. Error likely.

- All children who may be at nutritional risk due to overweight (i.e. weight for height greater than the 95th percentile when plotted on a standard growth chart).

  Note that an * indicates weight for height greater than the 95th percentile. Any percentile greater than 95 (e.g. 95, 96, 97, 98, 99, 100 or greater) will appear as "96*". These children should receive follow-up according to head Start guidelines.

If no Table 3 appears for a particular site, then no child in that site had weight/height above the 95th percentile or whose age was below 2.9 years.

TABLE 3

CHILDREN WITH WT/HT ABOVE THE 95TH PERCENTILE
OR CHILDREN WHOSE AGE IS LESS THAN 2.9 YRS
AN * INDICATES A WT/HT MEASUREMENT ABOVE THE 95TH PERCENTILE
TWO ** INDICATES AGE OF CHILD IS LESS THAN 2.9 YRS AND
PROBABLY AN ERROR, IF SO, PERCENTILE SCORES ARE INVALID

PROGRAM=

CHILD ID	AGE MOS	SEX	HEIGHT INS 8THS	HT/AGE %TILE	WEIGHT LBS 4THS	WT/AGE %TILE	WT/HT %TILE	MEDIC COND	ACUTE CHRONIC
DBRPOPE112	32**	F	35-2/8	28.8	24-2/4	4.0	6.9	NO	
DEAPOPE206	3**	M	39-2/8	96.0	35-1/4	96.0	69.7	DK	
DINPOPE104	51	F	45-4/8	96.0	67-1/4	96.0	96*	YES	OTHER
DUTPOPE108	30**	F	36-6/8	76.4	34-2/4	92.4	90.3	DK	
FRAPOPE109	36	M	40-2/8	93.7	51-0/4	96.0	96*	YES	OTHER
GASPOPE211	33**	M	38-0/8	79.6	35-1/4	83.7	78.3	DK	
MARPOPE214	50	M	44-2/8	96.0	54-0/4	96.0	96*	DK	
WOOPOPE119	49	M	43-6/8	96.0	54-0/4	96.0	96*	YES	OTHER

Title

Table 4: Children with Blood Pressure (BP) Above Normal, Hematocrit (Hct) or Hemoglobin (Hgb) Below Normal, Lead or FEP Above Normal Levels.

Definitions

Hct = Hematocrit
Hgb = Hemoglobin
FEP = Free Erythrocyte Protoporphyrin
Sys = Systolic Blood Pressure
Dia = Diastolic Blood Pressure

Explanation

Table 4 flags any child with an abnormal value for one or more of the following: blood pressure, hematocrit, hemoglobin, lead or FEP.

If no Table 4 appears for a particular site, then there were no children in that site with abnormal values for these measures.

The column on the far right labelled "Reason" lists the value of concern as well as the standard normal value. For example, "lead > 25" in the reason column indicates that the child listed had a lead value greater than normal, i.e. greater than 25.

Any child listed on this page should receive appropriate follow-up according to Head Start guidelines.

TABLE 4
CHILDREN WITH BP ABOVE NORMAL, HCT OR HGB BELOW NORMAL
LEAD OR FEP ABOVE NORMAL LEVELS

-- PROGRAM= --

CHILD ID	AGE MOS	SEX	BLOOD PRESSURE	HCT	HGB	FEP	LEAD	REASON
BERPOPE203	50	F	094/048	18	.	.	20	HCT<34
DBRPOPE112	32	F	079/042	36	.	62	12	FEP>35
DINPOPE104	51	F	120/080	.	.	.	.	BP HIGH
FRAPOPE109	36	M	090/072	39	.	.	39	LEAD>25

Title

Children Who Have Nutritional Risk Indicator(s) Who Do Not Participate in WIC.

Definitions

HEMATO = Hematocrit
HEMOGL = Hemoglobin
WAC = Weight/Age Percentile
HAC = Height/Age Percentile
WHC = Weight/Height Percentile

Explanation

Children listed on this table may be eligible for WIC benefits, but are not currently participating. Their potential eligibility is based on the fact that each child has one or more nutritional risk indicators. These indicators are starred (*) for each child.

0579N

```
                    CHILDREN WHO HAVE NUTRITIONAL RISK INDICATOR(S) WHO DO
                                  NOT PARTICIPATE IN WIC

---------------------------------------------------- REGION=          ---------------------------------------------------------------

     OBS   ID             AGE        PROGRAM       HEMATO   HEMOGL   LEAD   FEP    WAC    HAC    WHC    WIC

     219   DBRPOPE112     32                         36        .      12    62     4.0   28.8    6.9   NO
     220   ARAMYSTIC202   36                         35        .       .     .    94.1   96.0   99.9   NO
     221   DELMYSTIC105   54                         40      13.8      .     .    96.0   91.7   96.0   NO
     222   FRYMYSTIC107   52                         33      11.6      .     .    30.7   29.3   45.5   NO
     223   MCGMYSTIC210   34                          .        .       .     .    96.0   96.0   96.0   NO
     224   MEUMYSTIC215   45                         39        .      15     .     7.4    4.0   96.0   NO
     225   SILMYSTIC214   54                         27       9.2      .    16     4.0    4.0   20.0   NO
     226   BAREDG201      46                         36        .       .     .    13.5    4.0   54.5   NO
     227   BUTEDG203      47                          .        .       .     .    96.0   74.2   96.0   NO
     228   DOHEDG105      50                         37        .       .     .     4.0   10.3   10.1   NO
     229   KELEDG311      48                          .        .       .     .    96.0   85.7   96.0   NO
     230   TAMEDG204      42                         37        .       .    32     8.8    4.0   67.7   NO
```

APPENDIX B

Title

Children with Missing Height or Weight Values or Who Have Height or Weight Values Out of Age Range.

Definitions

DOB = Date of Birth

DOM = Date of Measurement

WHC = Weight/Height Percentile

WAC = Weight/Age Percentile

HAC = Height/Age Percentile

Explanation

This table lists all children for whom percentiles could not be calculated due to missing height or weight values. It also includes children who were very young, so that their percentile scores came out very high (96th or 99.9th percentile). Please check their birthdates for accuracy to determine if follow-up is required.

Note: These are not the same children who appear in appendix A.

Children appearing in this table are included in all other tables *except* appendix A and the first summary information table ("Children with Out of Range Weight/Age, Height/Age, or Weight/Height").

Appendix B

```
                               CHILDREN WITH MISSING HEIGHT OR WEIGHT VALUES OR WHO
                                 HAVE HEIGHT OR WEIGHT VALUES OUT OF AGE RANGE

-------------------------------------------- PROGRAM='             -----------------------------------------------------

      OBS      ID            PROGRAM          AGE     DOB        DOM       HEIGHT    WEIGHT    WHC     WAC     HAC

       9    DEAPOPE206                         3    08/15/87   11/18/87    39-2/8    35-1/4    69.7     96      96
```

MASS HS30.801: 988/exec. summ.

COLLECTION
[illegible]
University of Massachusetts
[illegible]

NUTRITION COUNTS

Massachusetts Nutrition Surveillance System
FY'88 Annual Report

- EXECUTIVE SUMMARY -

Massachusetts Department of Public Health
Health Promotion Sciences
Office of Nutrition
Bureau of Parent, Child and Adolescent Health
Office of Statistics and Evaluation

EXECUTIVE SUMMARY
OF THE

NUTRITION COUNTS

MASSACHUSETTS NUTRITION SURVEILLANCE SYSTEM

FY'88 ANNUAL REPORT

May 1989

Prepared by:

Jean L. Wiecha, MS
Carole A. Grandon, MS
Patrice Fisher-Miller, MPH
Catherine Boisvert Walsh, MPH, RD
Karen E. Peterson, DSc, RD

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC HEALTH

Michael S. Dukakis, Governor
Philip W. Johnston, Secretary, Executive Office of Human Services
Deborah Prothrow-Stith, MD, Commissioner, Department of Public Health
Howard Spivak, MD, Deputy Commissioner, Health Promotion Sciences
Deborah Klein Walker, Ed D, Assistant Commissioner
Bureau of Parent, Child and Adolescent Health

NUTRITION COUNTS

SUMMARY OF FINDINGS

This is a report of the Fall 1987 and Spring 1988 activities of Nutrition Counts, the pediatric portion of the Massachusetts Nutrition Surveillance System. The planning, implementation and results of this system are discussed, and recommendations for action are presented. The purpose of nutrition surveillance is to monitor the nutrition status of a population.

During FY'88 Nutrition Counts collected nutrition data from ten Head Start programs on 1727 Massachusetts children ranging in age from 2 years 9 months to 6 years. This report describes the final sample of 1605 Head Start children, of whom 61.0% were White, 23.9% were Hispanic, 10.0% were Black and 3.9% were Asians. Results from data on height, weight, iron status, and participation in several benefit programs are summarized below.

Height, Weight, and Anemia. The most common nutrition-related problems were overweight, short stature and probable iron deficiency anemia. These findings are consistent with those of the 1983 Massachusetts Nutrition Survey as well as the Centers for Disease Control Nutrition Surveillance Annual Summary (1983).

- Out of 1605 Nutrition Counts children, 9.6% were considered overweight (high weight-for-height) and 7.8% had short stature (low height-for-age), but only 1.4% were underweight (low weight-for-height).

- Probable iron deficiency anemia (low hematocrit and/or hemoglobin) was seen in 7.4% of the 1168 children with hematocrit or hemoglobin measures.

- Overall, more than one in five children had at least one indicator of malnutrition (underweight, overweight, short stature, or anemia). When overweight was excluded, more than one in seven children had one or more indicators of undernutrition.

Because earlier studies of nutritional status of Massachusetts children have shown a correlation between height and race, we looked at the distribution of low height for age by race in this sample. Among all children in this sample with short stature (low height-for-age), 68.8% were White, 17.6% were Hispanic, 7.2% were Asian and 6.4% were Black. However, within each racial group 8.8% of White children, 5.7% of Hispanics, 5.0% of Blacks and 14.3% of Asians had short stature.

Participation in means-tested benefit programs. Data on program participation show that families of Head Start children are likely to obtain income, food and medical assistance benefits through AFDC, Food Stamps, WIC and Medicaid.

- Almost two-thirds participate in three to four of these programs.

- However, despite likely eligibility, one-third did not participate in Food Stamps and almost 14% did not participate in WIC.

- Sixteen percent did not receive any assistance benefits at all.

From: Office of Nutrition, MDPH. Nutrition Counts FY'88 Annual Report.

RECOMMENDATIONS

Based on our findings our recommendations are as follows:

- The pediatric portion of the Massachusetts Nutrition Surveillance System should be expanded to include other early childhood programs.

  Surveillance integrated into other early childhood programs such as Early Intervention, Children and Youth, WIC, Growth and Nutrition and Day Care programs would allow for a more comprehensive and representative profile of high-risk children in Massachusetts. Use of these existing sources of data is both inexpensive and convenient.

- The Department of Public Health's Office of Nutrition should continue to work with the Head Start program to facilitate the identification, treatment, referral and follow-up of Head Start children at nutritional risk.

  To accomplish this, the Office of Nutrition should continue to enhance nutrition assessment skills of Head Start staff through training and technical assistance, to improve reliable height and weight measurement technique, to promote access to reliable measuring equipment and to develop Nutrition Counts reports that are timely, informative and easy to use for identification and follow-up of high risk children.

- Programs should be developed which enhance diet quality, ensure access to adequate food, and encourage appropriate levels of physical activity for preschool children and their families.

  Although acute undernutrition is not a significant problem in our target population, overweight, short stature and anemia are revalent. Educational efforts targeted towards health care providers, parents and teachers must be undertaken to address the impact of poor nutritional practices such as iron deficient diets, inadequate food intake, excessive calories or lack of physical activity on children's health and growth. The Department of Public Health should promote these educational activities.

- Within Head Start, targeted outreach efforts to increase participation in means-tested benefit programs should be undertaken.

  Our findings suggest that a number of Head Start families are not receiving the benefits for which they are eligible. The Office of Nutrition should work with the Administration for Children, Youth and Families Head Start Bureau and local Head Start programs to develop outreach strategies for Head Start families. Local programs can be assisted in utilizing the program participation information collected by their staff to increase the range of benefits obtained by eligible Head start families.

From: Office of Nutrition, MDPH. Nutrition Counts Annual Report.

- Accessible, adequate and appropriate public benefits and nutrition education programs are needed for high risk families in Massachusetts.

  The Department of Public Health should work in conjunction with other agencies to target outreach to assure that financially eligible children receive benefits. Strategies should be developed to improve access to public benefits and nutrition education for high risk families. Outreach to improve access should consider the adequacy and appropriateness of both public benefits and nutrition education programs, addressing such issues as complexity of application procedures, and reading level and language of informational materials.

- The Office of Nutrition should work with the Administration for Children, Youth and Families (ACYF) Head Start Bureau to enhance the accuracy of nutrition status measures to be reported in the FY'89 Head Start Program Information Report (PIR).

  In the Spring of 1989 Head Start programs across the United States will be required to report information to ACYF on the numbers of children identified and referred for nutritional risk. The Office of Nutrition should work with ACYF, Head Start programs in Massachusetts, and the regional office of the U.S. Department of Health and Human Services (HHS) to develop strategies that enhance the accuracy of nutritional risk information reported on the PIR.

From: Office of Nutrition, MDPH. Nutrition Counts FY'88 Annual Report.

NUTRITION COUNTS

FY'88 ANNUAL REPORT
EXECUTIVE SUMMARY

Background

In 1983 the Massachusetts Department of Public Health's Massachusetts Nutrition Survey found that malnutrition was a significant problem among low-income, preschool children. Of the 1429 children aged 6 months to 6 years included in the survey, almost one in five had some form of malnutrition. In response to this finding, the state legislature established the Office of Nutrition (ON) in the Department of Public Health and mandated that the Office develop a statewide surveillance system that would monitor nutritionally vulnerable groups in the population.

The first project in the Massachusetts Nutrition Surveillance System is called Nutrition Counts. It monitors the pediatric population age 6 years and under.

NUTRITION COUNTS

Goals and Objectives

The main goal of Nutrition Counts is to monitor the nutritional status of preschool children in Massachusetts. The objectives include the following:

> To describe and monitor the nutritional status of children in the Commonwealth, with particular emphasis on higher risk subgroups (e.g., under age 6, low-income, ethnic minority).
>
> To provide early warning data and trend data on the extent of malnutrition and nutrition-related health problems in the Commonwealth.
>
> To provide information on nutrition-related problems to legislators, administrators, and others who are responsible for policy, planning, and program management.
>
> To identify nutrition problems in children served by health, education and/or social service programs in order to facilitate effective program planning, expanded referral systems, and better access to quality care.
>
> To estimate the extent of unmet need for nutrition services in Massachusetts.

To provide local programs with a comprehensive system for identifying nutrition-related health problems in specific groups and for monitoring changes in the nutritional status of individuals served.

To provide a research base for investigating relationships among population characteristics (e.g. race, income), program use, public policy, nutritional status, health and disease.

To integrate Massachusetts surveillance data into the national Pediatric Nutrition Surveillance System maintained by the Centers for Disease Control.

Planning Phase

Based on pilot studies in 1986, Head Start programs were chosen as the first sites for nutrition surveillance. Head Start programs enroll children from low-income families and routinely collect information needed to monitor nutrition status. Head Start also provides a good environment for preventing nutrition problems as well as for identifying and referring children for specialized care. In Massachusetts, 35 Head Start programs serve 8100 low-income children. Children range in age from two years and nine months to six years.

Implementation

Implementation of Nutrition Counts began in Winter 1987. Implementation consisted of recruitment, training, data collection, data analysis, and preparation of reports. Prior to beginning these steps, the Office of Nutrition contacted the Department of Health and Human Services Administration for Children, Youth and Families (administering agency for Head Start), which offered its support of the project.

Recruitment. Of eleven Head Start programs contacted in the Winter and Spring of 1987, ten agreed to participate in Nutrition Counts. These were:

Cape Ann
Fall River
Lawrence
Leominster
Somerville
Springfield
Taunton
Westfield
Winthrop
Worcester

Recruitment continued through FY'88. Ten more programs plan to join Nutrition Counts in Fall 1988/Spring 1989. These programs are based in Berkshire County, Brockton, Cambridge, Framingham, Greenfield, Holyoke, Lowell, Lynn, Marshfield and New Bedford. We expect that a total of 20 sites will submit data for 4000 children in FY'89.

Training. Each site agreeing to participate in Nutrition Counts received training from ON staff on weighing and measuring techniques, use of growth charts, and use of the Nutrition Counts data form. Trainees were usually the Head Start Health Coordinator and/or the Nutrition Consultant, as well as any other Head Start staff or volunteers responsible for weighing, measuring, or data collection.

Data Collection. Head Start staff collected data in Fall 1987 or Spring 1988. After measuring the children, Head Start staff filled out a Nutrition Counts data form for each child.

The Nutrition Counts data form collects information on demographics, program participation, and nutritional status. All data were taken from children's records by Head Start staff. In order to protect confidentiality, Head Start staff assigned an identifying code to each child. After completing the forms, programs sent one copy to the Office of Nutrition and kept a carbon for their files.

The items on the data form were:

Child's Identification Code
Zip Code
Birthdate
Sex
Race
Ethnicity

Height
Weight
Hemoglobin and/or Hematocrit
FEP and/or Lead (FEP is Free Erythrocyte Protoporphyrin)
Birthweight
Blood Pressure

Program Participation:

- Head Start
- Family Day Care
- Health Center
- Special Supplemental Food Program for Women, Infants and Children (WIC)
- Early Intervention
- Food Stamps
- Aid to Families with Dependent Children (AFDC)

Child's Medical Insurance:

- Medicaid
- Self-Pay
- BC/BS (Blue Cross/Blue Shield
- HMO (Health Maintenance Organization)
- Other Commercial
- Other
- Combination

Acute or chronic medical conditions that might affect the child's growth.

Data Analysis. Forms completed by the Head Start staff were analyzed by MDPH's Statistics and Evaluation Unit.

Weight, height, and weight-for-height were converted to Z-scores, which express the child's anthropometric measurements in standard deviation units relative to the fiftieth percentile on reference growth charts. Actual height-for-age, weight-for-age, and weight-for-height percentiles were also calculated for each child.

We used the Centers for Disease Control (CDC) Anthropometric Software Package (CASP) to get Z-scores. (Goldsby, 1972). Analysis at MDPH was done using the Statistical Analysis System (SAS) package (SAS, 1985).

We also sent data to the CDC for inclusion in its national pediatric nutrition surveillance system. Currently 37 states, Puerto Rico, and Washington, D.C. (in addition to Massachusetts) participate in this system, which monitors height, weight and anemia measures among a largely low-income population of children.

Preparation of Reports. Each Head Start program that participated in Nutrition Counts received a report from MDPH's Office of Nutrition tabulating the program's information. Program summaries and site-by-site tables were included to identify children at risk for nutrition related problems and in need of further evaluation. Children were listed and identified by code only.

RESULTS AND DISCUSSION

During FY'88 Nutrition Counts received a total of 1727 data forms from 10 Head Start programs. Programs submitted from 58 to 458 forms depending on the size of the program and the number of measurements taken. Data on 122 children were removed because of missing or implausible data. Thus, the results presented in this report are based on a sample of 1605 children from 9 Head Start programs. The racial composition of the sample is shown in Table 1.

Nutrition Counts estimated the prevalence of underweight, overweight, short stature, low birthweight, and chronic health conditions in this sample of 1605 low-income preschool children. We also estimated the prevalence of probable iron deficiency anemia and possible lead poisoning in 1168 children for whom hematocrit and hemoglobin data were available and 958 children with free erythrocyte protoporphyrin (FEP) or blood lead values. Nutrition Counts also calculated levels of participation in several means-tested benefit programs for 1596 children for whom complete information was available.

Height, Weight, and Anemia

Standard cut-offs for abnormal anthropometric and hematological values were used in the data analysis. Underweight was defined as less than the 5th percentile of weight-for-height; overweight was defined as being above the 95th percentile of weight-for-height; and short stature was defined as a height measurement below the 5th percentile of height-for-age (all percentiles, National Center for Health Statistics). Blood values used to find cases of possible iron-deficiency anemia were: hemoglobin below 11 gm/dl, hematocrit below 34%, and FEP above 35 ug/dl. High blood lead was set at greater than 25 ug/dl.

By these criteria, 23 children (1.4% of 1605) were underweight by weight-for-height. Of 1605 children measured, 154 (9.6%) were overweight by weight-for-height, and 125 (7.8%) exhibited short stature (low height-for-age) (Table 2).

Because previous studies have shown a correlation between height and race, we looked at the distribution of low height-for-age by race in this sample. We found that among all children with short stature, 68.8% were White, 6.4% were Black, 7.2% were Asian, and 17.6% were Hispanic. The number and percent of children within each race group with short stature were as follows: among Whites, 86 (8.8%); among Blacks, 8 (5.0%); among Asian, 9 (14.3%); and among Hispanics, 22 (5.7%).

Hemoglobin and/or hematocrit values were reported for 1168 children. Of these, 86 (7.4%) had values below cut-offs for anemia. The proportion of children within each program for whom hematologic data were not available ranged from zero to 55%. FEPs (free erythrocyte protoporphyrin) were reported for 823 children; of these, 46 (5.6%) had high values indicating possible iron deficiency anemia and/or lead poisoning. Lead values were reported for 135 children, of whom 33 had values above the cut-off for lead poisoning (Table 3). Some children had more than one blood abnormality; as a result, these numbers are not additive.

Overall, certain indicators of malnutrition occurred more often, and others less often, than expected. Excessive underweight, overweight, short stature and anemia occurs when more than 5% of the population falls below the 5th percentile (or above the 95th in the case of overweight). The exact amount of excess is determined by simple subtraction (the expected value of 5% minus the observed value).

In our sample, 9.6% of Nutrition Counts children were overweight, an excess of 4.6% over the expected 5%. Similarly, low height-for-age (short stature) was observed in 7.8% of the sample, an excess of 2.8%. Conversely, underweight was lower than expected at 1.4%. Probable iron deficiency anemia, according to hematocrit and hemoglobin data, occurred in 7.4% of the sample, an excess of 2.4%. These differences from expected values were each statistically significant at the 0.05 level using chi-square tests for goodness of fit. See Tables 2 and 3.

We were also able to estimate the number and proportion of Head Start children with at least one indicator of malnutrition (low hemoglobin, low hematocrit, low weight-for-height, low height-for-age or high weight-for-height) (Table 4). Of the 1605 children sampled, 351 (21.9%) had at least one indicator of malnutrition. The range for programs was 18.5% to 29.3%. Because height and weight data were reported for 1605 children but blood data were available for only 1168 children the results in Table 4 are minimum estimates. If blood data had been available on all children there might have been a higher number of children with low hematocrit or hemoglobin. This would have raised the overall percentage of children with at least one indicator of malnutrition.

Overall, height, weight and blood results from Nutrition Counts indicate that short stature, overweight, and anemia are more frequent among low income Head Start preschoolers than in reference populations. Furthermore, greater than one in five children had at least one indicator of malnutrition (underweight, overweight, short stature, or anemia). When overweight was excluded, greater than one in seven children had one or more indicators of undernutrition (underweight, short stature, and anemia).

Findings from Nutrition Counts are consistent with those of the 1983 Massachusetts Nutrition Survey as well as the Centers for Disease Control Nutrition Surveillance Annual Summary (1983). Both have shown that overweight, short stature, and anemia occur frequently among low-income preschool children. Actual prevalence values differ among these surveys, however. Although the overall agreement among these studies enhances our confidence in Nutrition Counts' findings, the possible impact of several factors on our results must be considered.

Birthweight and Medical Conditions. Numerous biological and social factors may affect nutritional status (Rathbun, 1987) including birthweight and certain medical conditions.

Low birthweight (less than 5.5 pounds), especially due to symmetric intrauterine growth retardation, may affect stature throughout infancy, childhood and even adolescence (Fitzhardinge, 1972; Bech, 1975; Villar, 1982; Gayle, 1987). Of the 1605 children sampled in Nutrition Counts, 1454 had

birthweights reported. Of these, 102 (7.0%) were considered LBW. In the general U.S. population, 6.8% of births are LBW (DHHS, 1982) and in Massachusetts 5.6% of births are LBW (MDPH, 1986). Low birthweight may have made a small contribution to the prevalence of short stature among Head Start children (7.8%).

We wished to see how many children with low height-for-age or low weight-for-height currently or formerly had medical conditions that could account for their small size. Of the 1605 children in our sample, 143 exhibited short stature and/or low weight-for-height. According to Head Start data, only six of these children (4.2%) currently or formerly had medical conditions that might influence growth. Thus, medical conditions did not appear to be a significant cause of poor growth in our sample.

Participation in Head Start. Head Start may affect nutritional status because the program provides nutritious meals and snacks to children as well as nutrition education for staff, parents and children. This could cause our prevalence estimates to be lower than they might be among other low income preschool children, and in fact limits our ability to generalize from our results to other groups. Because of the unknown effect of Head Start participation on children's nutritional status, we caution against using Nutrition Counts prevalence estimates to extrapolate numbers of malnourished children in other low-income preschool populations since these populations may not be comparable.

Program Participation

All Programs. Complete information on program participation was reported for 1596 children out of our total population (1605). Of these, 417 (26.0%) received benefits from all of the following four programs: AFDC, Medicaid, Food Stamps and WIC. Moreover, 985 (62.0%) reported receiving benefits in three or four programs, the most common pattern being AFDC, Medicaid and Food Stamps (32.1%). Finally, 256 or 16.0% reported no participation in any programs.

Food Stamps. Most Head Start participants are probably eligible for Food Stamps. Food Stamp eligibility is based on income at or below 130% of poverty, while Head Start requires that children come from households with income below 100% of poverty (with the exception of handicapped children who do not need to meet this guideline). In our sample, 67% were receiving Food Stamps and a third were not. Participation in AFDC constitutes automatic eligibility for Food Stamps. Seventy-three (7.0%) of the AFDC participants were not receiving Food Stamps.

WIC. We were able to identify Head Start children who probably were eligible for WIC but not participating. For children, WIC eligibility is based on age under five years, household income below 185% of poverty, and demonstration of nutritional risk. We assumed that all Head Start children were financially eligible and then used Nutrition Counts cut-offs for underweight, overweight, short stature and anemia. We found that 219 children (13.6%) were WIC-eligible nonparticipants (Table 5). Since nutritional risk criteria for WIC eligibility are actually broader than the Nutrition Counts parameters, 13.6% is probably lower than the true proportion of WIC-eligible nonparticipants among Head Start Children.

Overall, data on program participation show that families of Head Start children are likely to get income, food, and medical assistance benefits through AFDC, Food Stamps, WIC and Medicaid. Two-thirds participated in three to four of these programs. However, almost one third of sample households did not participate in Food Stamps, about 14% of Head Start children did not receive WIC (even though they appeared to be at nutritional risk), and 16% did not receive any benefits at all (from AFDC, Food Stamps, WIC or Medicaid).

While Nutrition Counts data suggest that most households in the sample utilize benefit programs, the generalizability of this result to non-Head Start households is questionable. Households participating in Head Start may be more likely to use government benefits than other households, and are sometimes referred to such programs by Head Start staff. Therefore, our results probably overestimate participation by low-income households in the government assistance programs studied.

Implications of Findings

FY'88 Nutrition Counts findings suggest that thinness, often a reflection of acute undernutrition, does not appear to be a major public health concern among this population. The excessive prevalence of short stature, overweight and anemia, however, suggests that both chronic undernutrition and overnutrition are significant, though paradoxical, problems in this population, and that diets low in absorbable iron are also of concern. In addressing the nutritional problems of this population, consideration should be given to diet quality and physical activity as well as to calorie requirements.

Data on program participation indicate that some families who are eligible for assistance programs are not receiving benefits. Many studies and reports have shown that non-participation among eligibles is often due to lack of knowledge or understanding about programs. This suggests that targeted outreach efforts within Head Start could help a number of low income households get benefits for which they are eligible.

The ability of a low-income family to access or choose nutritionally appropriate foods is an important determinant of nutritional status. This ability may stem from factors such as economics, culture, food preferences, and education. Public benefits and nutrition education programs that are accessible, adequate and appropriate are needed to address the impact that poverty and poor nutritional practices may have on children's health.

Table 1

RACE OF NUTRITION COUNTS CHILDREN

Race	#	%
White	979	61.0%
Hispanic	384	23.9%
Black	160	10.0%
Asian	63	3.9%
Missing	14	0.9%
Other	5	0.3%
Total	1605	100%

Source: Office of Nutrition, Health Promotion Sciences, MDPH.

Table 2

PREVALENCE OF LOW HEIGHT FOR AGE, LOW WEIGHT FOR HEIGHT, AND HIGH WEIGHT FOR HEIGHT

Program and State Totals

Program	Number of Children	Low Height for Age # %	Low Weight for Height # %	High Weight for Height # %
Cape Ann	114	6 5.3%	0 0.0%	11 9.6%
Fall River	100	12 12.0%	3 3.0%	4 4.0%
Leominster	332	33 9.9%	6 1.8%	29 8.7%
Somerville	119	6 5.0%	2 1.7%	13 10.9%
Springfield	203	10 4.9%	4 2.0%	18 8.9%
Taunton	119	6 5.0%	1 0.8%	16 13.4%
Westfield	58	2 3.4%	0 0.0%	8 13.8%
Winthrop	102	10 9.8%	2 2.0%	9 8.8%
Worcester	458	40 8.7%	5 1.1%	46 10.0%
TOTAL	1605	125 7.8% *	23 1.4% *	154 9.6%*

* $.02<p<.05$

Source: Office of Nutrition, Health Promotion Sciences, MDPH.

Table 3

PREVALENCE OF ABNORMAL BLOOD VALUES

Program and State Totals

Program	Hematocrit or Hemoglobin			Free Erythrocyte Protoporphyrin			Lead		
	#	Low	%	#	High	%	#	High	%
Cape Ann	105	8	7.6%	8	0	NA*	1	1	NA
Fall River	100	3	3.0%	100	6	6.0%	0	0	NA
Leominster	289	11	3.8%	285	15	5.3%	20	7	NA
Somerville	53	4	7.5%	33	1	NA	12	1	NA
Springfield	139	10	7.2%	23	3	NA	32	17	NA
Taunton	105	7	6.7%	108	1	0.9%	1	0	NA
Westfield	50	9	18.0%	23	3	NA	7	0	NA
Winthrop	48	9	NA	46	7	NA	7	1	NA
Worcester	279	25	9.0%	197	10	5.1%	55	6	10.9%
TOTAL	1168	86	7.4% **	823	46	5.6%	135	33	24.4%

* NA = Not Applicable. Percentage calculations were omitted for samples of fewer than 50 children.

** .025<p<.05

Source: Office of Nutrition, Health Promotion Sciences, MDPH.

Table 4

NUMBER AND PERCENTAGE OF CHILDREN EXHIBITING AT LEAST ONE OF THE FOLLOWING INDICATORS: LOW HEMOGLOBIN, LOW HEMATOCRIT, LOW WEIGHT FOR HEIGHT, LOW HEIGHT FOR AGE OR HIGH WEIGHT FOR HEIGHT*

Program and State Totals

Program	Total Children	#	%
Cape Ann	114	24	21.1%
Fall River	100	21	21.0%
Leominster	332	69	20.8%
Somerville	119	22	18.5%
Springfield	203	40	19.7%
Taunton	119	28	23.5%
Westfield	58	17	29.3%
Winthrop	102	27	26.5%
Worcester	458	103	22.5%
TOTAL	1605	351	21.9%

Source: Office of Nutrition, Health Promotion Sciences, MDPH.

* Numbers and percentages listed above are minimum estimates of children with at least one indicator of malnutrition. See page 14.

Table 5

CHILDREN ELIGIBLE FOR WIC BENEFITS BUT NOT PARTICIPATING

Program and State Totals

Program	Total children	Number of Eligible* Non-participants	% of Children in Program
Cape Ann	114	10	8.8%
Fall River	100	0	0.0%
Leominster	332	32	9.6%
Somerville	119	11	9.2%
Springfield	203	36	17.7%
Taunton	119	7	5.9%
Westfield	58	6	10.3%
Winthrop	102	24	23.5%
Worcester	458	93	20.3%
TOTAL	1605	219	13.6%

Source: Office of Nutrition, Health Promotion Sciences, MDPH.

* Number of children in program under 5 years with at least one nutritional risk factor. It is assumed that all Head Start children meet the income eligibility criteria for WIC. These are minimum estimates of children with at least one indicator of malnutrition (as discussed on page 14).

LITERATURE CITED

1983 Massachusetts Nutrition Survey. Division of Family Health Services, Massachusetts Department of Public Health. Boston: October, 1983.

Pediatric Pilot of the Massachusetts Nutrition Surveillance System: Analysis and Recommendations. Massachusetts Department of Public Health. Boston: October, 1986.

US Department of Health and Human Services. 1984 Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. NIH Publication No. 84-1088. National Institutes of Health, September 1984.

Centers for Disease Control: Nutrition Surveillance 1983. Issued August 1985.

Fitzhardinge PM, Steven EM. The small-for-date infant: I. Later growth patterns. Pediatrics 1972; 49:671-681.

Bech GJ, van de Berg BJ: The relationship of the rate of intrauterine growth of low birthweight infants to later growth. J. Pediatrics 1975; 86:504-511.

Villar J, Belizian JM, Spaulding J et al.: Post-natal growth of intrauterine growth retarded infants. Early Human Dev 1982; 6:265-0271.

Gayle HD, Dibley MJ, Marks JS, Trowbridge FL: Malnutrition in the first two years of life. AJDC 1987; 141:531-534.

Goldsby JB. Pctl19d anthropometry Fortran subroutines. Atlanta: Centers for Disease Control, Nutrition Division, Health Promotion and Education, 1972.

SAS Institute, Inc. SAS User's Guide: Basic's Version 5 Edition. Cary, NC: SAS Institute, 1985.

Wiecha JL, Walsh CB, Grandon CA, Peterson KE, Fisher-Miller P, Palombo R. Prevalence of pediatric malnutrition in Massachusetts. Abstract and persentation, American Public Health Association Meetings, Boston, November 1988.

Rathbun JM, Peterson KE. Nutrition in failure to thrive. In: Grand FJ, Sutphen JL, Dietz WH (eds.): Pediatric Nutrition. Boston: Butterworths, 1987.

S. HS 30.801:989

GOVERNMENT DOCUMENTS
COLLECTION
NOV 20 1990
University of Massachusetts
Depository Copy

NUTRITION COUNTS

Massachusetts Nutrition Surveillance System
FY89 Annual Report

Massachusetts Department of Public Health
Office of Nutrition
Bureau of Parent, Child and Adolescent Health
Office of Statistics and Evaluation

June 1990

NUTRITION COUNTS

MASSACHUSETTS NUTRITION SURVEILLANCE SYSTEM

FY89 ANNUAL REPORT

1990

Prepared by:

Jean L. Wiecha, MS
Carole A. Grandon, MS, RD
Patrice Fisher-Miller, MPH
Catherine Boisvert Walsh, MPH, RD
Karen E. Peterson, DSc, RD

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC HEALTH

Michael S. Dukakis, Governor
Philip W. Johnston, Secretary, Executive Office of Human Services
David H. Mulligan, Commissioner, Department of Public Health
Howard Spivak, MD, Deputy Commissioner, Health Promotion Sciences
Deborah Klein Walker, Ed D, Assistant Commissioner
Bureau of Parent, Child and Adolescent Health

2438N

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH
Bureau of Parent, Child and Adolescent Health
Office of Nutrition (Ruth Palombo, MS, RD, Director)
Office of Statistics and Evaluation (Marlene Anderka, MPH, Director)

ACKNOWLEDGEMENTS

We are indebted to all the individuals at Head Start programs throughout Massachusetts for their cooperation and interest in Nutrition Counts. We also extend our thanks to the Administration for Children, Youth and Families, Head Start Bureau for their continued support, and to individuals at the Massachusetts Department of Public Health for their thoughtful comments and review of this report.

For more information on Nutrition Counts, contact:

Carole Grandon, MS, RD/Jean Wiecha, MS
Coordinators for Nutrition Surveillance
Office of Nutrition
Massachusetts Department of Public Health
150 Tremont Street
Boston, MA 02111
(617) 727-9283

TABLE OF CONTENTS

SUMMARY OF FINDINGS i

PROJECT DESCRIPTION AND RESULTS

Introduction 1

Methods 4

Results and Discussion 6

PROJECT EVALUATION AND DISCUSSION

Implications of Findings 10

Recommendations 12

LITERATURE CITED 14

TABLES/FIGURES 15

APPENDICES 27

NUTRITION COUNTS

SUMMARY OF FINDINGS

Nutrition Counts is the pediatric portion of the Massachusetts Nutrition Surveillance System. It monitors the nutritional status of groups of children enrolled in Head Start programs, private day care centers and preschools in Massachusetts. This continuous and regular data collection can detect warning signs of nutrition problems at the community level early enough so program planners and managers can use the information to improve the effectiveness of their programs and initiate population-based interventions. Individual children with nutritional problems are also identified at the program level so they can be referred for assessment and treatment if necessary. This report of the Fall, 1988 and Spring, 1989 (FY89) activities of Nutrition Counts describes the planning, implementation and results of the system and makes recommendations for action.

During FY89 Nutrition Counts collected nutrition information on 3552 children ranging in age from two years nine months to six years who were attending nineteen Head Start programs across Massachusetts. At least 90% of children in Head Start are from families with incomes at or less than 100% of the poverty level. Data on height, weight, iron status, and participation in several benefit programs (Food Stamps, AFDC, WIC, Medicaid) were collected. Of these children, 58% were white, 22% were Hispanic, 13% were black and 5% were Asian.

Nutrition Counts also collected nutrition data on 415 children age five months to seven years at 13 private day care centers and preschools in South and Central Berkshire County in conjunction with SSPUN (Surveillance of Severe Pediatric Undernutrition), a joint project of the Office of Statistics and Evaluation and Office of Nutrition. Heights and weights were measured. Of these children, 91% were white, 7% were black, and 2% were Hispanic and Asian. Information on family income was not available for these children.

NUTRITIONAL STATUS

HEIGHT, WEIGHT, AND ANEMIA

The most common nutrition-related problems among children in our Head Start sample were overweight, short stature and probable iron deficiency anemia. These findings are consistent with those of the 1983 Massachusetts Nutrition Survey (1) and our FY88 Nutrition Counts report. Prevalence estimates of overweight, underweight and short stature were lower than expected in day care children sampled.

Head Start

- Out of 3552 Head Start children, 366 (10.3%) were considered at risk for overweight (high weight-for-height).
- Short stature (low height-for-age), an indicator of possible chronic malnutrition, was identified in 306 (8.6%) of the Head Start children.
- Forty-four (1.2%) of the Head Start children were at risk for underweight (low weight-for-height).
- Probable iron deficiency anemia (low hematocrit and/or hemoglobin) was seen in 191 (7.8%) of the 2458 children with hematocrit or hemoglobin measures.
- Low height-for-age was seen most frequently among Asian and white children.
- High weight-for-height was seen most frequently among Hispanic children, followed by black and white children. Far fewer Asian children were at risk for overweight.
- Head Start children born with low birthweights were twice as likely to have short stature and four times as likely to be low weight-for-height as children with normal birthweights.

Day Care

- Out of 415 day care children in the final Nutrition Counts sample, 20 (4.8%) were considered at risk for overweight (high weight-for-height).
- Short stature (low height-for-age) was identified in 27 (6.5%) of the 415 day care children.
- Three (0.7%) of the day care children were at risk for underweight (low weight-for-height).
- Information on iron status and birthweight was not collected for children in day care or preschools.

PARTICIPATION IN BENEFIT PROGRAMS

Head Start data on program participation showed that 80% of families with children in Head Start obtained one or more income, food and/or medical assistance benefits through Aid to Families with Dependent Children (AFDC), Food Stamps, the Special Supplemental Food Program for Women, Infants and Children (WIC) or Medicaid. However, a significant percentage did not participate in Food Stamps and WIC despite likely eligibility.

- Despite likely eligibility, over one-fourth of Head Start families did not participate in Food Stamps.
- Over half of the children meeting WIC nutritional risk eligibility criteria did not participate in WIC.
- In addition, over one-fourth of the families who may have been eligible for AFDC did not participate in this program.
- Thirteen percent did not receive any assistance benefits at all.
- Twenty-eight percent of Head Start children participated in three or four of these programs (AFDC, Food Stamps, Medicaid and WIC).
- Ninety-five percent of children had health coverage through Medicaid or commercial insurance.
- Data on program participation were not collected for children in day care or preschools.

RECOMMENDATIONS

Among other actions, efforts are needed to:

- Expand the Massachusetts Nutrition Surveillance System so that it includes other early childhood programs and high risk populations.
- Develop and implement measures that reduce and prevent overweight, short stature and anemia.
- Increase participation by eligible families in benefit programs.

(See page 12 for detailed discussion of recommendations.)

INTRODUCTION

Growth is one of the most important indicators of a child's health status. The growth of a young child is sensitive to external factors including poor nutritional intake, infectious disease or environmental toxins such as lead. Measures of overweight, underweight, and short stature for age do more than describe the size of a child. These conditions may indicate that inadequate food intake, inappropriate food practices or an underlying health condition are affecting the growth of a child. In addition, nutritional status may be one of many factors that may influence attention, cognitive performance, emotional state and social functioning.

Inadequate financial resources can restrict a family's ability to purchase sufficient amounts of food. It is unlikely that families with incomes below the poverty level (equivalent to $12,100 per year for a family of four) can meet all of their financial and food needs without the benefit of assistance programs. An inadequate food supply, limited food choice and poor dietary habits may result in poor growth and poor cognitive and school performance among children in low-income families, making participation in food and nutrition assistance programs an important factor to consider in assessing the needs of low-income families.

Nutrition Counts, the pediatric portion of the Massachusetts Nutrition Surveillance System, monitors and describes the nutrition status of groups of children under age seven in the state. Continuous and regular data collection can detect warning signs at the community level early enough so program planners and managers can use the information to improve the effectiveness of their programs and to initiate population-based interventions. In FY89, the Nutrition Counts system analyzed data on 3552 children from Head Start programs statewide. At least 90% of these children come from families with incomes at or less than 100% of the poverty level. Nutrition Counts also analyzed data on 415 infants and children from group day care programs and preschools in South and Central Berkshire County. No income information was available for day care and preschool children. For Head Start children, this report presents data on nutritional status (height, weight, iron status and other measures) and participation in AFDC, Food Stamps, Medicaid, and the Special Supplemental Food Program for Women, Infants and Children (WIC). FY89 Head Start results are also compared to FY88 results. For day care and preschool children, this report presents information describing nutritional status based on heights and weights only. Iron status and other measures of nutritional status and program participation information were not available. Based on our findings, we conclude with recommendations for addressing issues of concern.

Background

In 1983 the Massachusetts Department of Public Health's Massachusetts Nutrition Survey found that probable malnutrition was a significant problem among low-income, preschool children (1). Of the 1429 children age six months to six years included in the survey, almost one in five had at least one indicator of probable malnutrition. In response to this finding, the state legislature established the Office of Nutrition (ON) in the Department of Public Health and mandated that the Office develop a statewide surveillance system that would monitor nutritionally vulnerable groups in the population. Nutrition Counts is the first project in the Massachusetts Nutrition Surveillance System. The decision to begin Nutrition Counts in Head Start was based on pilot studies conducted in 1986 (2) that showed Head Start to be the most feasible site for collecting nutritional status data.

With consent from the Administration for Children, Youth and Families, the federal administering agency for Head Start, ON collects Nutrition Counts data from Massachusetts Head Start programs. Head Start enrolls children from low-income families and routinely collects information needed to monitor nutrition status, making Head Start an ideal source of surveillance data. Head Start also provides a good environment for preventing nutrition problems as well as for identifying and referring children for specialized care. In Massachusetts, 35 Head Start programs serve over 8400 low-income children ranging in age from two years and nine months to six years.

Nutrition Counts data are also sent to the Centers for Disease Control (CDC) for inclusion in its national pediatric nutrition surveillance system. Currently, 38 states, the Navajo Nation, the Intertribal Council and Washington, DC participate in this system, which monitors height, weight, and indicators of iron-status among a largely low-income population of children. Most of CDC's data come from WIC programs.

During FY89, additional data were collected at private day care centers and preschools in South and Central Berkshire County by DPH SSPUN (Surveillance of Severe Pediatric Undernutrition) project staff. SSPUN is a three-year project funded by the Centers for Disease Control (CDC) and a joint project of the Office of Statistics and Evaluation and Office of Nutrition. The project is designed to develop a surveillance system to identify, report and refer severely undernourished children (primarily children less than the 3rd percentile weight-for-height) in an urban and rural area of Massachusetts. The information collected helps to describe the nutritional status of children enrolled in selected day care programs and to identify infants and children with severe pediatric undernutrition.

Nutrition Counts data are used to estimate the prevalence of certain potential nutrition problems in the overall population of preschool children in Massachusetts and to monitor the nutritional status of preschool children over time. The data are not used to make diagnoses of malnutrition in individual children, since some children with high or low weights or heights may be normal and healthy. Information that Nutrition Counts gives to participating sites can help identify high-risk children. But only further assessment of these children will determine if a nutritional problem that may require intervention and follow-up exists.

Goals and Objectives of Nutrition Counts

The goal of Nutrition Counts is to monitor the nutritional status of preschool children in Massachusetts. The objectives include the following:

To describe and monitor the nutritional status of children in the Commonwealth, with particular emphasis on higher risk subgroups (e.g., under age 6, low-income, ethnic minority).

To provide early warning data and trend data on the extent of malnutrition and nutrition-related health problems in the Commonwealth.

To enable the Massachusetts Department of Public Health to provide information on nutrition-related problems to legislators, administrators, and others who are responsible for policy, planning, and program management.

To identify nutrition problems in children served by health, education and/or social service programs in order to facilitate effective program planning, expanded referral systems, and better access to quality health care.

To enable the Massachusetts Department of Public Health to estimate the extent of unmet need for nutrition services in Massachusetts.

To provide local programs with a comprehensive system to identify nutrition-related health problems in specific groups and to monitor changes in the nutritional status of individuals served.

To provide a research base to investigate relationships among sociodemographic factors (e.g. race, income), program use, public policy, nutritional status, health and disease.

To integrate Massachusetts surveillance data into the national Pediatric Nutrition Surveillance System maintained by the Centers for Disease Control (CDC).

METHODS

Sample. Between Fall 1988 and Spring 1989, Nutrition Counts received information on 3552 children age two years nine months to six years attending 19 Massachusetts Head Start programs. Individual programs submitted from 19 to 429 forms depending on the size of the program and the number of measurements taken. At least 90% of the children were from households with incomes below 100% of federal poverty guidelines. In FY89, the poverty level was equivalent to an income of $12,100 for a family of four.

During the Spring of 1989, information was also collected on 415 children ranging in age from five months to seven years at 13 private day care centers and preschools in South and Central Berkshire County. There is no income eligibility requirement for private day cares and preschools.

Children in the Nutrition Counts sample are representative of the Head Start and day care programs participating in Nutrition Counts only, and are not necessarily representative of all Head Start or day care programs or of all children in the Commonwealth.

Information collected. Each Head Start and day care center/preschool collected information once during the school year. Both Head Start and day care data were coded to protect the children's right to confidentiality. For each Head Start child sampled, Head Start staff reported height, weight, sex, age, birthdate, and date of measurement. For most children they also reported hemoglobin and/or hematocrit, free erythrocyte protoporphyrin (FEP) and blood lead (along with date of bloodwork), birthweight, pre-existent medical conditions that may affect growth, and household participation in AFDC, Food Stamps, Medicaid, and WIC. A sample data form is in Appendix A. Information was submitted voluntarily to Nutrition Counts by Head Start staff, who are required by federal regulations to obtain data on nutritional status for all children enrolled.

At each day care center and preschool, DPH staff collected height, weight, sex, age, birthdate and date of measurement.

Measurement Methods. Head Start staff weighed and measured children but generally obtained blood values from children's health care providers. DPH staff weighed and measured children at day care centers and preschools. No blood values were collected at day care centers and preschools. All children were weighed to 1/4 pound using beam balance or digital scales. Their heights were measured to 1/8 inch using wall-mounted metal measuring tapes and headblocks (Handi-Stats, Perspective Enterprises, Kalamazoo Michigan) or stadiometers.

Data Quality. To maximize data quality, DPH staff trained Head Start personnel in the measurement of children, the selection and maintenance of appropriate equipment for weighing and measuring, and the use of the Nutrition Counts data form. Training at Head Start was provided when the programs first agreed to participate and when new staff were hired.

MDPH Analysis. Standard criteria were used to identify all children with low weight-for-height, low height-for-age and high weight-for-height (Table 1). Prevalence estimates for these nutrition status indicators were considered significantly different from the National Center for Health Statistics reference population if confidence intervals did not include the expected value of five percent.*

In Head Start children, prevalence estimates were also calculated for probable iron deficiency anemia, high blood pressure, lead poisoning, low birthweight and chronic health conditions.

We also examined the Head Start sample to obtain percentages of children participating in AFDC, Food Stamps, Medicaid and WIC. In addition, MDPH estimated the proportion of children eligible for WIC according to age and nutrition risk who were not enrolled in this program. We assumed all households of Head Start children were income eligible for WIC (185% of federal poverty guidelines).

All analyses were carried out by the Office of Statistics and Evaluation (OSE) at MDPH.

CDC Analysis. Nutrition Counts data will be sent to the Centers for Disease Control (CDC) for inclusion in its national pediatric nutrition surveillance system.

Dissemination of Results. Each Head Start program that participated in Nutrition Counts received an individualized report from MDPH's Office of Nutrition tabulating that program's information. Program summaries and tables identified children at risk for nutrition-related problems and in need of further evaluation. Children were listed and identified by code only. Programs received their reports three to seven weeks from the date that all of their data were received at MDPH. ON offered to help programs use the reports for follow-up of individual children and for program planning.

An aggregate report tabulating day care and preschool data was compiled by ON and SSPUN staff and distributed to participating day care centers.

---

* Prior to analysis, data were cleaned to remove records of children with missing heights and weights or with outlying values (age less than 33 months with height/age or weight/age above 95th percentile, or any Z-score less than or equal to -6.0 (CDC, personal communication). Aggregate descriptive data were compiled using the Statistical Analysis System (SAS) (3). Z-scores and 95% confidence intervals were calculated for the proportion of children with low height-for-age, underweight, overweight, and probable iron deficiency anemia using CASP and dEpid statistical software (4,5).

RESULTS AND DISCUSSION

Head Start and day care/preschool data are presented separately because the groups differ in four ways: race, age range, geographic distribution, and types of data collected (only anthropometric and demographic data were collected at day care centers/preschools) (Tables 2 and 3).

Sample

Head Start. The final sample consisted of 3552 children from 19 Head Start programs. Data on 79 (2.2%) of the original 3631 children were removed because of missing or biologically implausible information. Within the final sample, 2458 (69.2%) had a hematocrit or hemoglobin value reported. Participation levels in AFDC, Food Stamps, Medicaid, and WIC were based on the complete sample of 3552. Characteristics of the final Head Start sample are shown in Table 2.

Day Care. The final sample consisted of 415 children from 13 day care centers and preschools. Characteristics of the final day care/preschool sample are shown in Table 3.

Anthropometric Evidence of Poor Nutrition

Head Start. Among Head Start children, 10.3% were at risk for overweight and 8.6% were low height-for-age (Figure 1). These proportions are higher than the 5% expected based on reference populations. The prevalence of low weight-for-height was 1.2% among Head Start children, which was lower than expected. In individual Head Start programs, the prevalence of high weight-for-height ranged from 5% to 16.3%; low height-for-age ranged from 3.3% to 16.3% and low weight-for-height ranged from 0% to 3.7% (Table 4).

Day Care and Preschool. Among day care and preschool children, 4.8% were at risk for overweight, while 6.5% of children were low height-for-age, and 0.7% had low weight-for-height. (Figure 2). Results for individual day care centers and preschools are presented in Table 5.

Other Analyses of Head Start Information

The following information pertains to Head Start only. Information is presented on anemia, lead poisoning, medical conditions, race and anthropometry, birthweight and program participation.

Anemia; Lead Poisoning. Among the 2458 Head Start children for whom hemoglobins and/or hematocrits were available, 191 (7.8%) had probable iron deficiency anemia, exceeding the expected 5% in the reference population (Table 6). In addition, 6.7% (154) of 2308 children with FEP measurements had high values suggesting anemia or possible lead poisoning, and 38 of 384 lead measurements were elevated.

Medical Conditions and Anthropometry. An issue of interest was the extent to which children with low height-for-age or low weight-for-height had current or former medical conditions that could influence their growth. Of the 3552 Head Start children sampled, 342 were at risk for short stature (low height-for-age) and/or underweight (low weight-for-height). According to our results, 18 (5.3%) of these children currently or previously had a medical condition that might influence growth.

Race and Anthropometry. We looked at the distribution of low height-for-age, low weight-for-height and high weight-for-height by race in the Head Start sample (Table 7). Our results showed the following:

Low height-for-age did not occur at the same prevalence among different racial groups. It was highest among white and Asian children (10.6% and 11.3%, respectively). White and Asian children were overrepresented among low height-for-age children; that is, the proportion of low height-for-age children who were white or Asian exceeded the proportion of all Nutrition Counts Head Start children who were white or Asian.

Low weight-for-height, on the other hand, was distributed fairly evenly among racial groups, and the proportions of children at risk for underweight in each racial group were very similar to the proportions of all children who were in each racial group.

High weight-for-height was approximately two to three times higher than the expected value of 5% among whites (8.9%), blacks (10.7%), and Hispanics (14.3%). In addition, Hispanic children were overrepresented, while Asian children were underrepresented.

Birthweight and Anthropometry. Of the 3552 Head Start children in Nutrition Counts, 3082 had birthweights reported. Of these, 260 (8.4%) were low birthweight (LBW). In the United States, 6.8% of births are LBW and in Massachusetts 6.0% of births are LBW (MDPH, 1988). Low birthweight (less than 5.5 pounds), especially due to chronic intrauterine growth retardation, may affect stature throughout infancy, childhood, and even adolescence (6-9).

Low birthweight children were twice as likely as normal birthweight (NBW) children to have low height-for-age (relative risk 2.09; $p < 0.001$). We found that 15.8% of LBW children (41) had heights below the fifth percentile, compared to 8.2% of NBW children and 8.9% of all children with birthweights reported.

It is important to note that LBW can be a manifestation of either premature birth or intrauterine growth retardation. We did not collect information to distinguish between preterm babies and small, full-term babies. In clinical settings, ages of premature children are generally adjusted until the age of 3 years 6 months (by subtracting weeks premature from age) before plotting height on growth charts (10). Because we were unable to make this adjustment, children younger than 3 1/2 years born prematurely may have been misclassified as having short stature.

LBW children were four times more likely to be at risk for underweight (low weight-for-height) than NBW children (relative risk 4.26; $p < 0.001$). While 1.0% of NBW children (and 1.3% of all children with birthweights reported) were at risk for underweight, 4.2% (11) LBW children were at risk for underweight. One fourth of all underweight children were LBW. The apparent high risk of underweight among LBW children in Nutrition Counts may in part be an artifact of small sample size, since only 44 Head Start children were at risk for underweight overall.

Possible lead poisoning and low height-for-age. Among 185 Head Start children with an elevated FEP or lead value, 10.8% had heights below the fifth percentile, compared to an overall low height-for-age prevalence of 8.6% in the entire sample. The association between possible lead poisoning and low height-for-age was not statistically significant (relative risk 1.18; $p = 0.5$). It should be noted that FEP and lead data were not available for 31% of the sample.

Comparison Between FY'88 AND FY'89 Results

We compared prevalence estimates from FY88 and FY89 data collection to see whether any changes had occurred in levels of low height-for-age, low weight-for-height, high weight-for-height or possible iron-deficiency anemia. Comparisons were made using data from the eight programs that submitted data both in FY88 and FY89. Comparisons were based on total program results and not matched for individual children since the intent was not to measure growth improvement among individual children but rather to identify any changes in prevalence estimates in group data. No significant year-to-year differences were apparent (Figure 3).

Program Participation

Information on participation in AFDC, Food Stamps, Medicaid and WIC revealed that 80% of the Head Start children came from families that received benefits from one or more means-tested programs (Table 9). Moreover, 58% of the sample participated in at least three of these programs. The most common pattern of multiple program participation was AFDC, Medicaid, Food Stamps, and WIC reported in 30% of cases (1060).

While 68% of the sample was enrolled in Medicaid, 95% of the children had some form of health insurance (Medicaid or private insurance).

While most Head Start children were from families receiving benefits, some families were not receiving any benefits and many were not receiving all benefits for which they were probably eligible. Over half (761, 51.7%) of the 1472 children eligible for WIC due to size or iron status were not in WIC. WIC will also accept children who meet other nutritional risk criteria that we did not consider, including diet, mental health, and certain medical conditions. We do not know how considering these other risk factors would change our figures. In addition, 13% (477) of all Head Start children in Nutrition Counts did not participate in any of the four programs we examined. Over one quarter did not participate in AFDC (948, 26.7%) or Food Stamps (970, 27.3%). While almost a third were not in Medicaid, most had some other type of health insurance; 179 (5.0%) had no health insurance at all.

While Nutrition Counts data suggest that most households in the sample use benefit programs, the generalizability of this result to other low-income households is questionable. Households participating in Head Start may be more likely to use government benefits than other households, and are often referred to such programs by Head Start staff. Therefore, our results probably overestimate participation by low-income households in the government assistance programs studied.

Implications of Findings

Head Start

Probable iron-deficiency anemia, high weight-for-height, and low height-for age are the leading nutrition problems amoung low-income preschoolers attending Head Start programs.

- The prevalence of low hematocrits and hemoglobin values (7.8%) suggests that many Nutrition Counts children have diets low in absorbable iron.
- Of particular concern in Nutrition Counts is the prevalence of high weight-for-height, which at 10.3% is more than double the expected value of 5%. High weight-for-height was more common among Hispanics and Blacks. Interventions that increase physical activity and develop healthy eating habits among preschool children can help address this problem.
- The prevalence of low weight-for-height (1.2%) among Head Start children is significantly lower than expected, suggesting that acute undernutrition is not a common problem in this population. The prevalence rate of low weight-for-height was fairly evenly distributed across all race groups.
- The significant prevalence (8.6%) of low height-for-age (possible stunting), especially among whites and Asians, raises the possibility that a greater proportion of children were low weight-for-height at earlier ages (12). Stunting may follow a period of wasting, and may also reflect past or current chronic nutrient deficits, as well as undernutrition *in utero* (13).
- Low birthweight children appear to be at a higher risk for undernutrition. However, without being able to control for premature birth, it is difficult to assess the severity of the risk.

Children who are underweight, overweight or short for their age are a high risk group and should receive immediate assessment and follow-up. Children who are underweight or short for their age may appear healthy on examination, but may be undernourished due to chronic illness, repeated acute illnesses, and/or one or more environmental stresses in the household. Such stresses include poverty, lack of medical care, substandard housing, and poor parenting skills. Children who are overweight may remain so in adulthood, and have a higher risk of developing diabetes, heart disease and other health problems associated with overweight (11).

Confirmation of diagnosis, referral to appropriate health, nutrition, and social services, and monitoring of children with extreme height, weight, or blood measures can be accomplished at Head Start programs.

Our program participation data showed that many households in the Nutrition Counts sample used benefit programs; however, some did not. While Head Start already routinely refers families to benefit programs, our data suggest that some households still do not receive benefits for which they are eligible. To address this issue, it will be necessary to validate participation data and find out if nonparticipation by eligible households is due to lack of information about programs, lack of interest, or some other reason. Plans for improving participation should be based on these findings.

Day care centers/Preschools

Our results from selected day care centers and preschools in South and Central Berkshire County suggest that underweight, overweight, or short stature do not appear to be a major public health concern among these children. The different racial distributions of the day care/preschool children, as well as the potentially different family economic status could influence the different anthropometric findings. It may be that the day care/preschool children are representative of a higher income population than the Head Start population. Although this population does not appear to be at risk for certain nutritional risk indicators, it must be emphasized that the individual children identified as being at risk for underweight, short stature or overweight still require assessment, follow-up and possible intervention.

We caution against using Nutrition Counts Head Start prevalence estimates to extrapolate proportions of malnourished children in other low-income preschool populations since these populations may not be comparable. Head Start may improve nutritional status because the program provides nutritious meals and snacks to children as well as nutrition education for staff, parents and children. This could cause our prevalence estimates to be lower than they might be among other low-income preschool children.

RECOMMENDATIONS:

- The Office of Nutrition (ON) should continue to expand the pediatric portion of the Massachusetts Nutrition Surveillance System (MNSS) to include children at risk in other early childhood programs.

  Surveillance integrated into other early childhood programs such as Early Intervention, Children and Youth, and WIC would give a more comprehensive and representative profile of high-risk children in Massachusetts and permit other programs to benefit from surveillance data describing the needs of their target groups. To date, ON has expanded Nutrition Counts to include day care centers and preschools in South and Central Berkshire County. The MNSS also plans to begin collecting both pediatric and prenatal data through the WIC Management Information System (a computerized data management system) when this is on line. Integration of nutrition surveillance data into existing sources of data is both inexpensive and convenient.

- The Office of Nutrition should develop recommendations for health interventions that local programs can use to prevent and reduce the prevalence of overweight, short stature, anemia, and underweight.

  Develop recommendations to assist local Head Start and other early childhood programs in designing specific strategies for addressing these nutrition-related problems. Emphasis will be on the follow-up, referral and treatment of high-risk children, and education and training of parents.

- Agencies serving families with young children should develop targeted outreach efforts that will increase participation in means-tested benefit programs.

  Our findings suggest that many Head Start families are not receiving the benefits for which they are eligible. Therefore, it will be useful for the Office of Nutrition to work with the Administration of Children, Youth and Families Head Start Bureau and local Head Start programs to develop outreach strategies for Head Start families. In addition, increased coordination between WIC and Head Start could increase WIC participation by Head Start children who are at nutritional risk.

- The Department of Public Health's Office of Nutrition should continue to work with the Head Start program to facilitate the identification, treatment, referral and follow-up of Head Start children at nutritional risk.

  To accomplish this, the Office of Nutrition should continue to enhance nutrition assessment skills of Head Start staff through training and technical assistance, to improve the reliability of height and weight measurement techniques and to develop Nutrition Counts reports that are timely, informative and easy to use for identification and follow-up of high-risk children.

- The Office of Nutrition should work with Centers for Disease Control (CDC) and the National Head Start Association to actively promote Head Start participation in nutrition surveillance on a national level.

  Currently Massachusetts is one of the few states in CDC's Pediatric Nutrition Surveillance System to collect Head Start data. Increasing Head Start participation nationally would be an incentive to Head Start programs in Massachusetts.

LITERATURE CITED

1. 1983 Massachusetts Nutrition Survey. Division of Family Health Services, Massachusetts Department of Public Health. Boston: October, 1983.

2. Pediatric Pilot of the Massachusetts Nutrition Surveillance System: Analysis and Recommendations. Massachusetts Department of Public Health. Boston: October, 1986.

3. SAS Institute, Inc. SAS User's Guide: Basic's Version 5 Edition. Cary, NC: SAS Institute, 1985.

4. Goldsby JB. Pctl19d anthropometry Fortran subroutines. Atlanta: Centers for Disease Control, Nutrition Division, Health Promotion and Education, 1972.

5. Sullivan KM, Foster DA. dEPID, V.2.1. Atlanta: Centers for Disease Control, 1987.

6. Fitzhardinge PM, Steven EM. The small-for-date infant: I. Later growth patterns. Pediatrics 1972; 49:671-681.

7. Bech GJ, van de Berg BJ: The relationship of the rate of intrauterine growth of low birthweight infants to later growth. J. Pediatrics 1975; 86:504-511.

8. Villar J, Belizian JM, Spaulding J et al.: Post-natal growth of intrauterine growth retarded infants. Early Human Dev 1982; 6:265-0271.

9. Gayle HD, Dibley MJ, Marks JS, Trowbridge FL: Malnutrition in the first two years of life. Am J Dis Children 1987; 141:531-534.

10. Peterson KG, Frank DA: Feeding and Growth of Premature and Small-for-Gestational-Age Infants. In Taeuch HW, Yogman MW (eds): Follow-Up Management of the High-Risk Infant. Boston: Little, Brown and Company, 1987.

11. Winick M: Childhood Obesity: Special Reference Briefs. NAL SRB 88-05. Beltsville, Maryland: National Agricultural Library, USDA, 1988.

12. De Soysa PE, Waterlow JC. Stunting and the prevalence of malnutrition. Lancet 1981; 1:1430.

13. Rathbun JM, Peterson KE. Nutrition in failure-to-thrive. In: Grand RF, Sutphen JL, Dietz WH (eds): Pediatric Nutrition. Boston: Butterworths, 1987.

TABLE 1
CRITERIA FOR ABNORMAL VALUES

NUTRITION COUNTS, FY89

INDICATOR	CUT-OFF VALUE	INTERPRETATION
Low Height-for-Age	< 5th percentile on National Center for Health Statistics (NCHS) Growth Charts	Short stature; possible chronic undernutrition
Low Weight-for-Age	< 5th percentile on NCHS Growth Charts	Underweight; possible chronic or acute undernutrition
Low Weight-for-Height	< 5th percentile on NCHS Growth Charts	Underweight; possible acute undernutrition
High Weight-for-Height	> 95th percentile on NCHS Growth Charts	Overweight or Obesity; possible chronic overfeeding or lack of activity
Low Hemoglobin *	< 11 grams/dl	Possible iron deficiency anemia
Low Hematocrit *	< 34%	Possible iron deficiency anemia
High Free Erythrocyte Protoporphyrin **	> 35 ug/dl	Possible iron deficiency and/or lead poisoning
High Lead **	> 25 ug/dl	Lead poisoning
High Blood Pressure ***	> 116/76	Hypertension
Low Birthweight	< 2500 grams	Low Birthweight

---

* Sources of standards for anemia in preschool children:

- Centers for Disease Control Nutrition Surveillance Summary Report, 1983. Issued August, 1985.
- Head Start Program Performance Standards, 1984.
- Pediatric Nutrition Handbook, 2nd ed., American Academy of Pediatrics, 1985.

** Sources of standards for FEP and LEAD:

- Bellinger, D et al. Correlates of low level lead exposures in urban children at two years of age. Pediatrics (1986) 77:326-833.
- Kiempe, CH et al. eds. Current Pediatric Diagnosis and Treatment. Los Altos, CA: Lange Medical Publications, 1984.

*** Source of standards for blood pressure:
US Department of Health and Human Services, The 1984 Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. NIH Publication No. 84-1088. National Institutes of Health, September, 1984.

Table 2

CHARACTERISTICS OF NUTRITION COUNTS CHILDREN FROM MASSACHUSETTS HEAD START PROGRAMS, FY89

	NUMBER	PERCENT
RACE		
White	2051	57.8%
Hispanic	791	22.3%
Black	450	12.7%
Asian	168	4.7%
Missing	55	1.5%
Other	37	1.0%
Total	3552	100.0%
AGE		
< 3 years	60	1.7%
3 years - 6 years	3491	98.3%
> 6 years	1	0.0%
Total	3552	100.0%
SEX		
Male	1785	50.3%
Female	1767	49.7%
Total	3552	100.0%

Source: MDPH, Office of Nutrition, 1989.

Table 3

CHARACTERISTICS OF NUTRITION COUNTS CHILDREN FROM BERKSHIRE COUNTY DAY CARE CENTERS AND PRESCHOOLS, FY89

	NUMBER	PERCENT
RACE		
White	378	91.1%
Black	28	6.7%
Hispanic	1	0.2%
Asian	5	1.2%
Other	2	0.5%
Missing	1	0.2%
Total	415	100.0%
AGE		
< 1 year	5	1.2%
1 year - 3 years	51	12.3%
3 years - 6 years	341	82.2%
> 6 years	18	4.3%
Total	415	100.0%
SEX		
Male	204	49.2%
Female	211	50.8%
Total	415	100.0%

Source: MDPH, Office of Nutrition and Office of Statistics and Evaluation, 1989.

Table 4
HEAD START PROGRAMS
PREVALENCE OF LOW HEIGHT-FOR-AGE, LOW WEIGHT-FOR-HEIGHT, AND HIGH WEIGHT-FOR-HEIGHT

Program and State Totals
Nutrition Counts, FY89

Program	Number of Children	Low Height-for-Age # (%)	Low Weight-for-Height # (%)	High Weight-for-Height # (%)
Berkshire County	253	32 (12.6%)	0 (0.0)	20 (7.7%)
Brockton	322	29 (9.0%)	12 (3.7%)	37 (11.5%)
Cambridge	173	14 (8.1%)	1 (0.6%)	24 (13.9%)
Fall River	100	11 (11.0%)	0 (0.0%)	5 (5.0%)
Framingham	228	11 (4.8%)	2 (0.9%)	31 (13.6%)
Franklin	117	18 (15.4%)	3 (2.6%)	10 (8.5%)
Greater Lawrence	178	8 (4.5%)	0 (0.0%)	29 (16.3%)
Hampshire County	60	2 (3.3%)	0 (0.0%)	4 (6.7%)
Leominster/MOC	325	35 (10.8%)	5 (1.5%)	37 (11.4%)
Lowell	300	23 (7.7%)	1 (0.3%)	26 (8.7%)
Lynn	128	17 (6.3%)	1 (0.8%)	21 (16.4%)
Marshfield	111	7 (16.3%)	2 (1.8%)	6 (5.4%)
New Bedford	199	22 (11.1%)	1 (0.5%)	16 (8.0%)
Somerville	147	11 (7.5%)	1 (0.7%)	13 (8.8%)
Springfield	209	9 (4.3%)	4 (1.9%)	16 (7.7%)
Taunton	135	10 (7.4%)	0 (0.0%)	12 (8.9%)
Westfield	19	0	1	0
Winthrop/CAPIC	119	5 (4.2%)	4 (3.4%)	14 (11.8%)
Worcester	429	42 (9.8%)	6 (1.4%)	45 (10.5%)
Total	3552	306 (8.6%)	44 (1.2%)	366 (10.3%)

Percentage calculations were omitted for samples of fewer than 50 children.

Source: MDPH, Office of Nutrition, 1989.

Table 5
DAY CARE CENTERS AND PRESCHOOLS
PREVALENCE OF LOW HEIGHT-FOR-AGE, LOW WEIGHT-FOR-HEIGHT, AND HIGH WEIGHT-FOR-HEIGHT

Program and State Totals
Nutrition Counts, FY89

Program	Number of Children	Low Height-for-Age #	(%)	Low Weight-for-Height #	(%)	High Weight-for-Height #	(%)
Hope Community	36	4		2		0	
Berk Family/Children	44	2		0		0	
Red Door	29	1		0		0	
Rockwell E.C.C.	24	1		0		3	
TOT Spot	50	5	(10.0%)	0	(0.0%)	2	(4.0%)
YMCA E.C.C.	63	4	(6.3%)	1	(1.6%)	5	(7.9%)
Wendell Nursery	47	5		0		4	
Bright Horizons	28	3		0		3	
Knesset Israel	33	0		0		2	
St Pauls C.C.	29	0		0		0	
Sunshine Nursery	16	0		0		0	
S. Berks E.C.C.	11	1		0		1	
Berks Hills	5	1		0		0	
Totals:	415	27	(6.5%)	3	(0.7%)	20	(4.8%)

Percentage calculations were omitted for samples of fewer than 50 children.

Source: MDPH, Office of Nutrition and Office of Statistics and Evaluation, 1989.

Table 6
PREVALENCE OF ABNORMAL BLOOD VALUES
HEAD START PROGRAMS, NUTRITION COUNTS, FY89
Program and State Totals

	Hematocrit or Hemoglobin			Free Erythrocyte Protoporphyrin			Lead		
Program	# Measures	# Low	% Low	# Measures	# High	% High	#Measures	# High	% High
Berkshire	243	11	4.5%	172	5	2.9%	75	5	6.7%
Brockton	240	11	4.6%	157	16	10.2%	16	3	
Cambridge	112	8	7.1%	55	1	1.8%	3	0	
Fall River	100	2	2.0%	100	6	6.0%	0	0	
Framingham	0	0	0.0%	225	8	3.4%	1	0	
Franklin	96	8	8.3%	93	10	10.8%	9	2	
Greater Lawrence	133	17	12.8%	147	1	0.7%	17	0	
Hampshire	51	5	9.8%	53	4	7.5%	17	1	
Leominster/MOC	272	5	1.8%	273	21	7.7%	35	4	
Lowell	274	29	10.6%	249	22	8.8%	74	9	12.2%
Lynn	69	6	8.7%	104	24	23.1%	33	3	
Marshfield	64	10	15.6%	2	0		0	0	
New Bedford	106	10	9.4%	183	11	6.0%	7	1	
Somerville	63	1	1.6%	90	5	5.6%	9	0	
Springfield	91	13	14.3%	15	4		3	1	
Taunton	134	6	4.5%	131	11	8.4%	10	0	
Westfield	19	2		17	0		0	0	
Winthrop/CAPIC	74	12	16.2%	17	2		12	5	
Worcester	317	35	11.0%	225	3	1.3%	63	4	6.3%
Total	2458	191	7.8%	2308	154	6.7%	384	38	9.9%

* Percentage calculations were omitted for samples of fewer than 50 children.

Source: MDPH, Office of Nutrition, 1989.

Table 7
LOW HEIGHT-FOR-AGE, LOW WEIGHT-FOR-HEIGHT, AND HIGH WEIGHT-FOR-HEIGHT, BY RACE HEAD START PROGRAMS, NUTRITION COUNTS, FY89

		LOW HEIGHT-FOR-AGE (LHA)			LOW WEIGHT-FOR-HEIGHT (LWH)			HIGH WEIGHT-FOR-HEIGHT (HWH)		
RACE	TOTAL	N with LHA	N as % of Race Group	N as % all LHA (N=306)	N with LWH	N as % of Race Group	N as % all LWH (N=44)	N with HWH	N as % of Race Group	N as % all HWH (N=366)
WHITE	2051	218	10.6%	71.2%	25	1.2%	56.8%	183	8.9%	50.0%
BLACK	450	24	5.3%	7.8%	4	0.9%	9.1%	48	10.7%	13.1%
HISPANIC	791	38	4.8%	12.4%	11	1.4%	25.0%	113	14.3%	30.9%
ASIAN	168	19	11.3%	6.2%	2	1.2%	4.5%	8	4.8%	2.2%
OTHER **	37	2	5.4%	0.7%	0	0.0%	0.0%	7	18.9%	1.9%
MISSING **	55	5	9.1%	1.6%	2	3.6%	4.5%	7	12.7%	1.9%
TOTAL	3552	306	NA	99.9*%	44	NA	99.9*%	366	NA	100.0%

* Columns do not add to 100.0% due to rounding.

** Values in these rows should be interpreted with caution due to small sample sizes.

Source: MDPH, Office of Nutrition, 1989.

Table 8
PARTICIPATION IN AFDC, FOOD STAMPS, MEDICAID AND WIC

1. Participation in Each Program

Nutrition Counts children, Head Start component, FY89

N = 3552

Program	Number Participating	Percent Participating
AFDC	2206	62.1%
Food Stamps	2179	61.3%
Medicaid	2427	68.3%
WIC	1483	41.8%

Source: MDPH, Office of of Nutrition, 1989.

Table 9
PARTICIPATION IN AFDC, FOOD STAMPS, MEDICAID AND WIC

2. Participation in Multiple Programs

Nutrition Counts children, Head Start component, FY89

N = 3552

Number of programs	Number participating	Percent participating
All Four Programs*	1060	29.8%
Any Three Programs*	999	28.1%
Any Two Programs*	273	7.7%
Any One Program*	512	14.4%
No Programs**	477	13.4%
Other***	231	6.5%

* Indicates child's record identified child as a participant. A child's status in programs other than the 1, 2 or 3 with a "yes" response was "no" or "unknown".

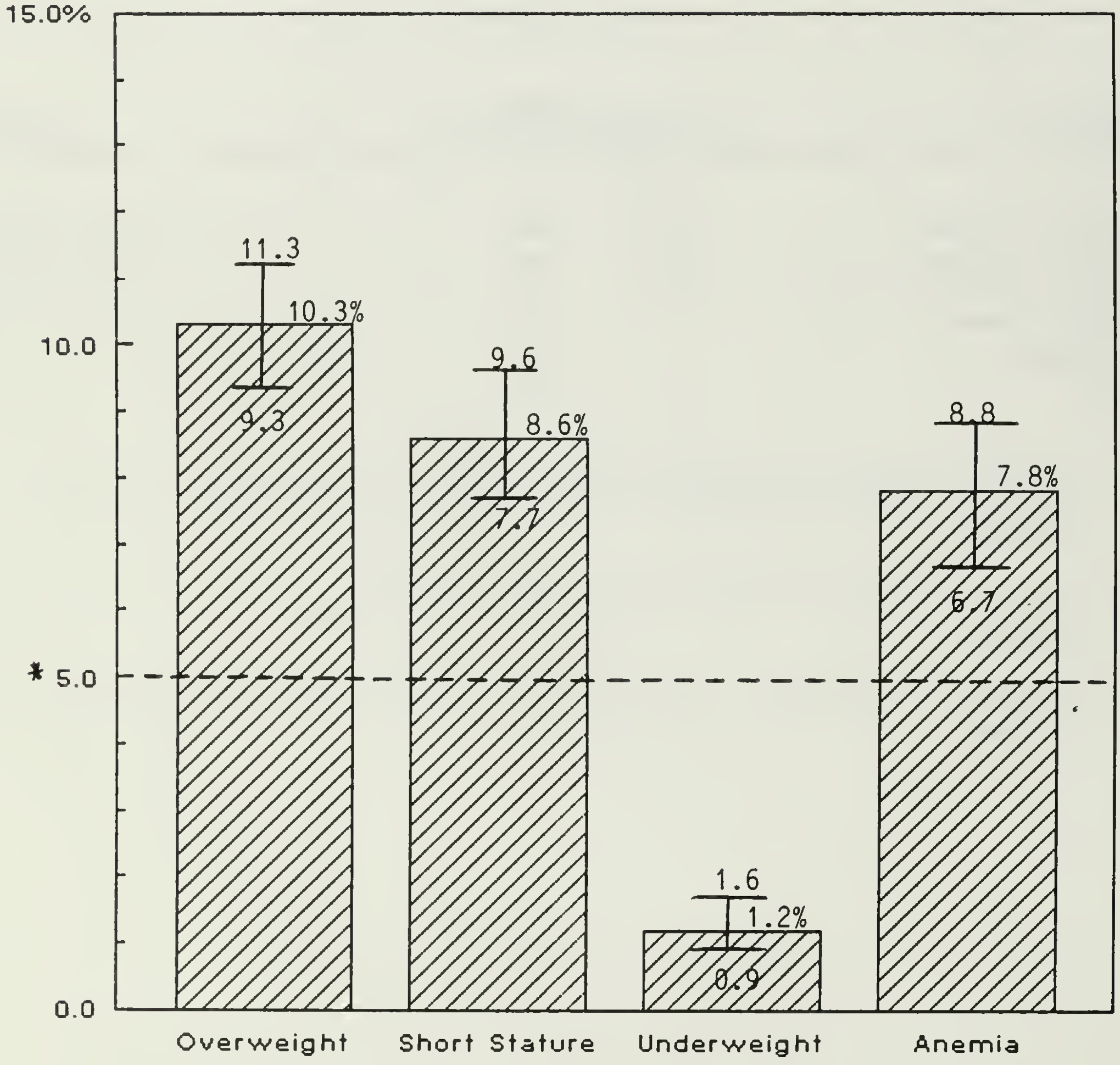
** Child's record indicates child was not a participant in any of these programs.

*** Most data were unknown; child was not known to participate in any of these programs.

Source: MDPH, Office of Nutrition, 1989.

FIGURE 1

OVERWEIGHT, SHORT STATURE, UNDERWEIGHT & ANEMIA HEAD START CHILDREN

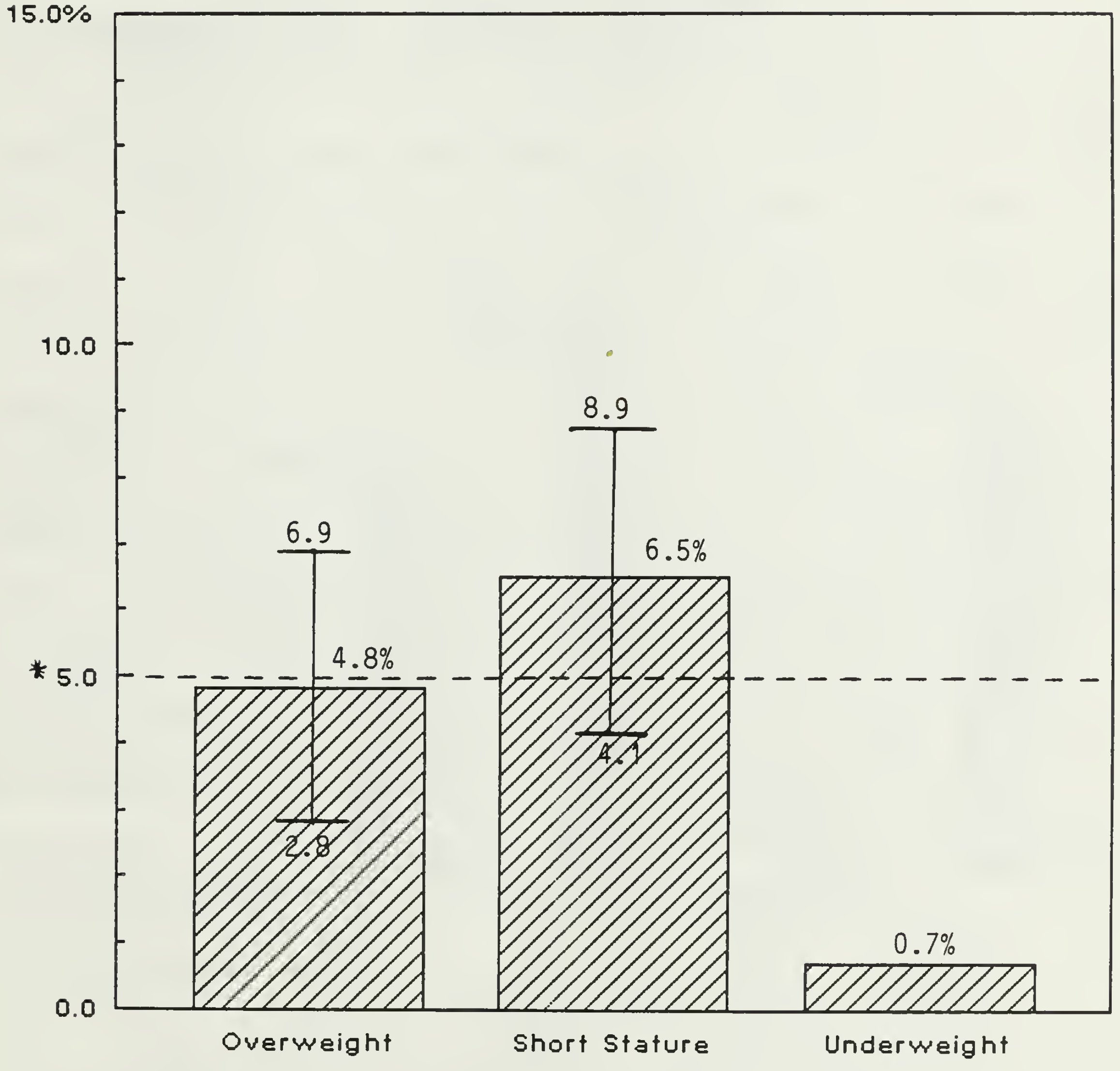


* Expected Prevalence
N=3352

Nutrition Counts, FY'89
Source: MDPH, Office of Nutrition, 1989

FIGURE 2

OVERWEIGHT, SHORT STATURE AND UNDERWEIGHT DAYCARE/PRESCHOOL CHILDREN

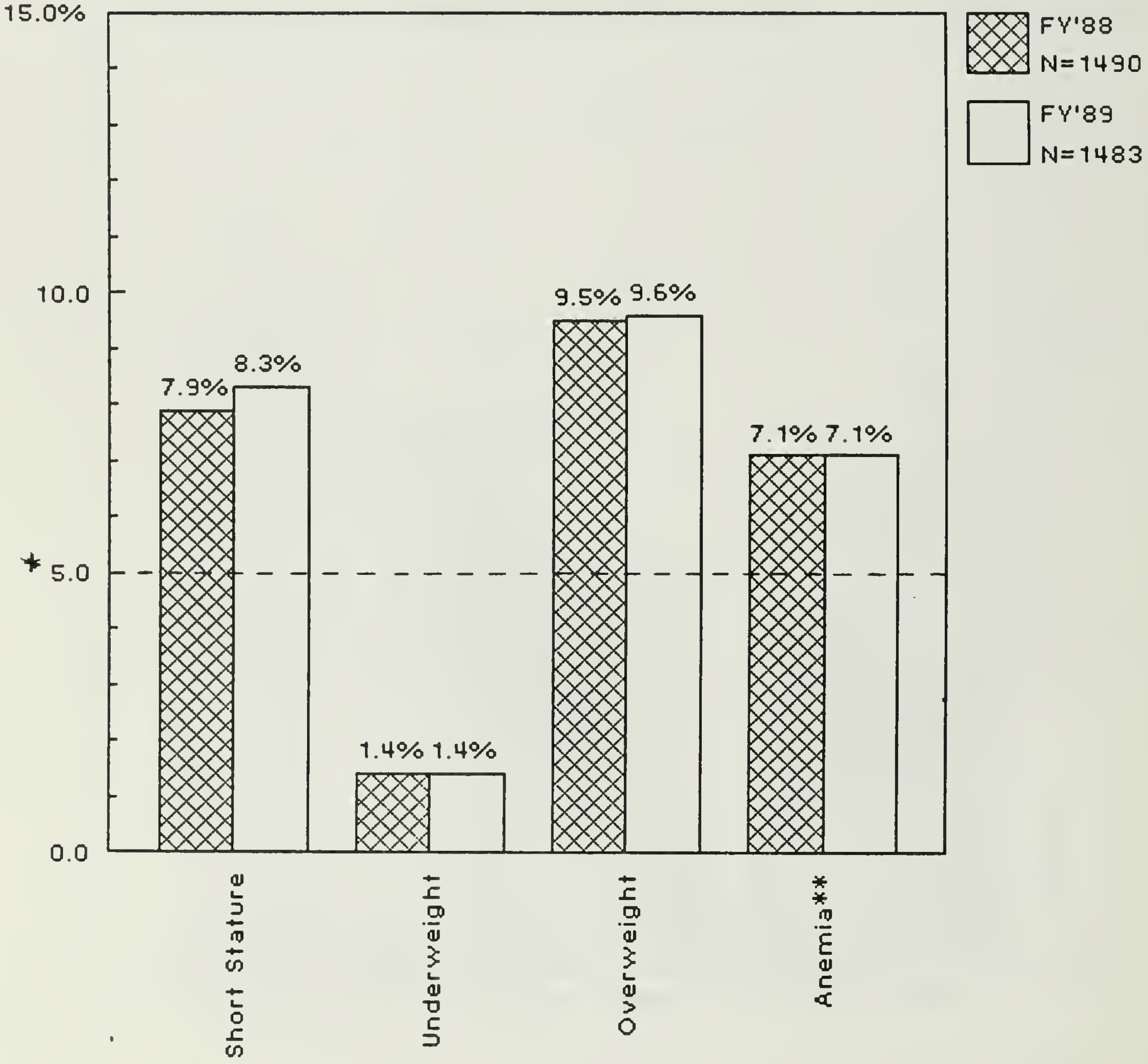


* Expected Prevalence
N=415

Nutrition Counts, FY'89
Source: MDPH, ON and OSE, 1989

FIGURE 3

COMPARISON OF FY'88 AND FY'89 RESULTS
8 HEAD START SITES WITH FY'88 & FY'89 MEASURES



* Expected Prevalence

Source: MDPH, Office of Nutrition, 1989

** FY'88 N=1058
FY'89 N=1070

Appendix A

MA8S03

NUTRITION COUNTS
Pediatric Health and Nutrition Data Form

SITE ☐☐☐ TOWN ☐☐☐

MDPH 8/87

1. CHILD IDENTIFICATION
   a.enter first 3 letters of last name — 1.a ☐☐☐
   b.enter child code or record number — b ☐☐☐☐☐☐☐☐☐

2. ZIP CODE — 2. ☐☐☐☐☐

3. DATE OF BIRTH — 3. ☐☐/☐☐/☐☐

4. SEX M or F — 4. ☐

5. RACE 1=White 2=Black 3=Asian 4=Other (specify)____________ — 5. ☐

6. ETHNIC ORIGIN — 6. ☐☐

01=Haitian	04=Cape Verdean	07=Vietnamese
02=Puerto Rican	05=Portuguese	08=Cambodian
03=Other Hispanic (specify)____________	06=Chinese	09=Laotian
	10=Other(specify) ____________	

7. DATE OF HEIGHT/WEIGHT MEASUREMENT — 7. ☐☐/☐☐/☐☐

8. HEIGHT ☐☐☐.☐ cms or ☐☐ inches ☐/8ths

9. WEIGHT ☐☐☐☐☐ grams or ☐☐ lbs ☐/4ths

10. DATE OF BLOOD TEST (most recent) — 10. ☐☐/☐☐/☐☐

11. HEMOGLOBIN (gm/100 ml) — 11. ☐☐☐.☐

OR

12. HEMATOCRIT (percent) — 12. ☐☐

13. DATE OF FEP and/or LEAD (most recent) — 13. ☐☐/☐☐/☐☐

14. FEP ☐☐☐ ug/dl — 15. LEAD ☐☐☐ ug/dl

16. BIRTHWEIGHT ☐☐☐☐ grams or ☐☐ lbs ☐☐ oz

17. BLOOD PRESSURE ☐☐☐/☐☐☐ (systolic/diastolic)

8. PROGRAM PARTICIPATION (Current Status) 1=yes 0=no 9=unknown

☐ a.Head Start	☐ d.Health Center	☐ g.Food Stamps
☐ b.Family Day Care	☐ e.WIC	☐ h.AFDC
☐ c.Center-based Day Care	☐ f.Early Intervention	

9. CHILD'S MEDICAL INSURANCE — 19. ☐

1=Medicaid	4=HMO	7=Combination ____________
2=Self Pay	5=Other Commercial	9=unknown
3=BC/BS	6=Other	

.a. In your opinion, does this child have a medical condition that might affect his/her height or weight or general nutritional status? 1=yes 0=no 9=don't know — 20.a ☐

.b. If yes, please circle the number of the acute or chronic condition below which the child has exhibited: — 20.b ☐☐ DPH USE ONLY

ACUTE CONDITIONS (present only)
01=Diarrhea or vomiting for over 24 hours
02=Dehydration
03=Anorexia
04=Acute respiratory distress

CHRONIC CONDITIONS (past or present)
05=Amputation or congenital limb absence (digits excepted)
06=Cancer
07=Chromosomal abnormality
08=Chronic diarrhea, Crohn's, ulcerative colitis, celiac
09=Cleft palate
10=Cystic fibrosis, broncho-pulmonary dysplasia
11=Sickle cell, thalassemia, any other blood disorder (except anemia)
12=Dwarfing conditions
13=Endocrine disease
14=Renal disease that requires special diet or medicine
15=Severe cerebral palsy or severe mental retardation
16=Structural heart disease
17=Failure to thrive
18=Appliance or cast
19=Anorexia nervosa/bulimia
20=Other, please specify ____________

MASS. HS30.801: 990 √

NUTRITION COUNTS

Massachusetts Nutrition Surveillance System
FY90 Annual Report

GOVERNMENT DOCUMENT
COLLECTION
SEP 12 1991
University of Massachusetts
Depository Copy

Massachusetts Department of Public Health
Bureau of Parent, Child and Adolescent Health
Office of Nutrition
Office of Statistics and Evaluation

January 1991

NUTRITION COUNTS

MASSACHUSETTS NUTRITION SURVEILLANCE SYSTEM

FY90 ANNUAL REPORT

1991

Prepared by:

Jean L. Wiecha, M.S.
Carole A. Grandon, M.S., R.D.
Patrice Fisher-Miller, M.P.H.
Diana Seder, M.P.H.

Commonwealth of Massachusetts
Department of Public Health

David H. Mulligan, Commissioner
Deborah Klein Walker, EdD, Assistant Commissioner,
Ruth Palombo, MS, RD, Director, Office of Nutrition
Marlene Anderka, MPH, Director, Office of Statistics & Evaluation

ACKNOWLEDGEMENTS

We are indebted to all the individuals at Massachusetts Head Start programs, kindergartens, community-based day care centers and preschools who participated in Nutrition Counts during FY90. We also extend our thanks to the Administration for Children, Youth and Families, Head Start Bureau for their continued support, to Marlene Anderka, Ruth Palombo, and Karen Peterson at the Massachusetts Department of Public Health for their thoughtful comments and review of this report, to Patricia Powell for preparing the text and tables, and to Dennis Sterzin for graphic design.

For more information on Nutrition Counts, contact:

Jean Wiecha, MS, Office of Nutrition
Massachusetts Department of Public Health
150 Tremont Street
Boston, MA 02111
(617) 727-9283

TABLE OF CONTENTS

EXECUTIVE SUMMARY i
    Nutritional Status i
    Participation in Benefit Programs ii
    Recommendations ii

INTRODUCTION 1
    Overview 1
    Background 1
    Goals and Objectives of Nutrition Counts 3

METHODS 4
    Definitions 4
    Sample 4
    Information Collected 4
    Measurement Methods 5
    MDPH Analysis 5
    Data Quality 6
    Dissemination and Use of Results 6

RESULTS AND DISCUSSION 7
    Head Start 7
    SSPUN Sites 9

IMPLICATIONS OF FINDINGS 10

RECOMMENDATIONS 12

TABLES AND FIGURES 14

SOURCE NOTES 30

APPENDIX 31

EXECUTIVE SUMMARY

Nutrition Counts, the pediatric portion of the Massachusetts Department of Public Health's (MDPH's) Nutrition Surveillance System, monitors and describes aspects of nutritional status among groups of young children in the state. Continuous and regular collection of nutrition data can provide early warning at the community level so program planners and managers can intervene to improve the effectiveness of their programs and to initiate population-based interventions. Participating in surveillance also helps local programs identify individual children needing further assessment or treatment for nutrition problems. This, the third annual Nutrition Counts report, describes FY90 activities of the system, presents and discusses results, and concludes with recommendations for action.

This report presents findings describing 3181 low-income children ranging in age from two years nine months to six years attending sixteen Head Start programs across Massachusetts. Of the children in the Head Start sample, 42% were white, 26% were Hispanic, 22% were black and 3% were Asian. Data on height, weight, iron status, blood lead levels and participation in several benefit programs (Food Stamps, AFDC, WIC, Medicaid) were collected.

This report also presents height and weight data describing 1995 children age two months to eight years at 23 private day care centers, 11 public preschools and 25 public kindergartens in South and Central Berkshire County. These data were collected as part of a Centers for Disease (CDC) funded effort at MDPH to establish a system for surveillance of severe pediatric undernutrition (SSPUN). SSPUN project children screened in Berkshire County were predominantly white. Information on family income and benefit program participation was not available for these children.

NUTRITIONAL STATUS

The most common nutrition-related problems among children in our Head Start sample were overweight, short stature and probable iron deficiency anemia. These conditions were significantly more common than in healthy reference populations. Also, the proportions of children who were overweight or anemic were higher in FY90 than in FY89 or FY88.

Significant nutrition-related problems among children screened through the SSPUN project were short stature in the public preschool group, and overweight in the kindergarten group.

Children in Head Start

- Out of 3181 Head Start children, 423 (13.3%) were considered overweight (high weight-for-height).

- Short stature (low height-for-age), an indicator of possible chronic malnutrition, was identified in 230 (7.2%) of the Head Start children.
- Forty-five (1.4%) of the Head Start children were underweight (low weight-for-height).
- Probable iron deficiency anemia (low hematocrit and/or hemoglobin) was seen in 278 (12.2%) of the 2282 children with hematocrit or hemoglobin measures.
- Among children with specified race status, short stature was seen most frequently among Asian (14.7%) and white (10.9%) children.
- Also among children with known race, overweight was seen most frequently among Hispanic children (17.4%), followed by black (12.8%) and white (10.6%) children.
- Among Head Start children with birthweights reported, 8.5% were born with low birthweights. The proportions of low birthweight children who had short stature or were underweight were twice as high as the proportions of normal birthweight children with these problems.

Children in Private Day Care Centers, Public Preschools, and Public Kindergartens (SSPUN Project).

- In public preschools that target children with physical and developmental disabilities, 25 (11.4%) of 219 children measured had short stature.
- In public kindergartens, 106 (10.1%) of 1050 children measured were overweight.

PARTICIPATION IN BENEFIT PROGRAMS

Seventy-seven percent of the children surveyed in Head Start programs were from households that obtained one or more income, food and/or medical assistance benefits through Aid to Families with Dependent Children (AFDC), Food Stamps, the Special Supplemental Food Program for Women, Infants and Children (WIC) or Medicaid.

- However, at least 26% did not receive AFDC, 28% did not participate in Food Stamps, and 51% did not participate in WIC despite likely eligibility.
- Fifteen percent did not receive any assistance benefits at all.
- Sixty-one percent of Head Start children participated in three or four of these programs (AFDC, Food Stamps, Medicaid and WIC).
- Eighty-nine percent of Head Start children had health coverage through Medicaid or commercial insurance.

RECOMENDATIONS

Collaborative efforts between MDPH, Head Start, and other agencies are needed to:

- Develop and implement interventions that reduce and prevent overweight, short stature and iron-deficiency anemia.
- Increase participation by eligible families in benefit programs.
- Improve understanding of the magnitude, severity, and distribution of nutrition problems among Massachusetts children.

Recommendations are presented in greater detail on pages 12-13.

INTRODUCTION

Growth is one of the most important indicators of a child's health status. The growth of a young child is sensitive to external factors including poor nutritional intake, infectious disease or environmental toxins such as lead. Measures of overweight, underweight, and short stature for age do more than describe the size of a child. These conditions may signal that inadequate food intake, inappropriate food practices or an underlying health condition are present. In addition, nutritional status may be one of many factors that influence a child's attention, cognitive performance, emotional state and social functioning.

Inadequate financial resources can restrict a family's ability to purchase sufficient amounts of food. It is difficult for families with incomes below the poverty level (equivalent in 1989 to $12,100 per year for a family of four) to meet all of their financial and food needs without the benefit of assistance programs. Monitoring participation in food and nutrition assistance programs is important in assessing the nutrition needs of low-income families.

Nutrition Counts, the pediatric portion of the Massachusetts Department of Public Health's (MDPH) Nutrition Surveillance System, monitors and describes aspects of nutritional status among groups of young children in the state. Continuous and regular collection of nutrition data can provide early warning of problems at the community level. Program planners and managers can then intervene to improve the effectiveness of their programs and to initiate population-based interventions. Participating in surveillance also helps local programs identify individual children needing further assessment or treatment for nutrition problems. This, the third annual Nutrition Counts report, describes FY90 activities of the system, presents and discusses results, and concludes with recommendations for action.

OVERVIEW

This report presents cross-sectional data describing 5176 infants and young children in Massachusetts. Of these, 3181 attended Head Start programs throughout the state, and 1995 attended private day care programs, public preschools, and public kindergartens in South and Central Berkshire Counties. Data describe these children's nutritional status (height, weight, iron status and other measures) and Head Start households' participation in AFDC, Food Stamps, Medicaid, and the Special Supplemental Food Program for Women, Infants and Children (WIC). FY90 Head Start results are also compared to FY89 and FY88 results.

BACKGROUND

In 1983 the Massachusetts Department of Public Health's Massachusetts Nutrition Survey found that indicators of poor nutritional status were elevated above levels considered normal among low-income infants and young children[1]. Of the 1429 children age six months to six years included in the survey, almost one in five had at least one indicator of potential malnutrition. In response to survey findings, the state legislature established the Office of Nutrition (ON) in the MDPH and mandated that the Office develop a statewide surveillance system to monitor nutritionally vulnerable groups. Nutrition Counts, the initial project in the Massachusetts Nutrition Surveillance System, began in 1987. With consent from the Administration for Children, Youth and Families (the federal administering agency for Head Start), ON collects Nutrition Counts data from Massachusetts Head Start programs.

The decision to begin Nutrition Counts in Head Start was based on pilot studies conducted in 1986[2]. Head Start enrolls children from low-income families and routinely collects information on their nutritional status, making Head Start an ideal source of surveillance data. Through its health and nutrition components, Head Start also provides a good environment for preventing nutrition problems as well as for identifying and referring children for specialized care. Head Start provides nutritious meals and snacks, carries out comprehensive health screenings that include growth assessment, and works closely with parents when problems are identified. In Massachusetts, 35 Head Start programs serve over 8400 low-income children ranging in age from three years to six years. By regulation, at least 90% of these children come from families with incomes at or less than 100% of the poverty level.

During FY89 and FY90, additional Nutrition Counts data were collected at private day care centers, public preschools and kindergartens in South and Central Berkshire County by MDPH's SSPUN (Surveillance of Severe Pediatric Undernutrition) project staff. SSPUN is a three-year project funded by the Centers for Disease Control (CDC) and is carried out jointly by the MDPH's Office of Statistics and Evaluation and the Office of Nutrition. The project is being conducted in four states and is designed to develop a surveillance system to identify, report and refer severely undernourished children (primarily children less than the 3rd percentile weight-for-height). In Massachusetts, project staff worked with 92 health care and community-based sites in Roxbury, North Dorchester, and South and Central Berkshire County to identify these children.

The three SSPUN settings we report on serve populations that differ from each other and from Head Start. We include them in order to demonstrate that nutritional risk profiles vary among groups of Massachusetts children with different age, socioeconomic status, and other characteristics. The private daycare centers have no income eligibility guidelines and charge a fee for enrollment. However, some of the centers have subsidized slots available to low-income families. The preschools in the public schools are free. By design, they serve a high percentage of children with physical and developmental disabilities who are at risk for having difficulties in school and who lack access to other preschool programs. Finally, the public school kindergartens serve a cross-section of children in the towns where they are located.

Nutrition Counts data are used to estimate the extent of certain potential nutrition problems among children in Massachusetts for whom measurements are available. In addition, Nutrition Counts monitors these annual point prevalence estimates over time. The data are not used to make diagnoses of malnutrition or poor growth in individual children, since some children with high or low weights or heights may be normal and healthy. Although Nutrition Counts can help identify high-risk children, only further assessment of these children will determine if a nutritional problem exists that may require intervention and follow-up.

Nutrition Counts data are also used by the Centers for Disease Control (CDC) in its national pediatric nutrition surveillance system. Currently, 43 states, the Navajo Nation, the Intertribal Council and Washington, DC participate in this system, which monitors height, weight, and indicators of iron-status among a largely low-income population of children. Data collection in Head Start is unique in this system: 71% of CDC's data come from WIC programs, 20% from EPSDT, and 8% from well-child visits.

GOALS AND OBJECTIVES OF NUTRITION COUNTS

The goal of Nutrition Counts is to monitor the nutritional status of preschool children in Massachusetts. The objectives include the following:

- To describe and monitor the nutritional status of children in the Commonwealth, with particular emphasis on higher-risk subgroups (e.g., under age 6, low-income, ethnic minority).
- To provide early warning data and trend data on the extent of malnutrition and nutrition-related health problems in the Commonwealth.
- To enable the Massachusetts Department of Public Health to provide information on nutrition-related problems to legislators, administrators, and others who are responsible for policy, planning, and program management.
- To identify nutrition problems in children served by health, education and/or social service programs in order to facilitate effective program planning, expanded referral systems, and better access to quality health care.
- To enable the Massachusetts Department of Public Health to estimate the extent of unmet need for nutrition services in Massachusetts.
- To provide a research base to investigate relationships among sociodemographic factors (e.g., race, income), program use, nutritional status, health and disease.
- To integrate Massachusetts surveillance data into the national Pediatric Nutrition Surveillance System maintained by the Centers for Disease Control (CDC).

METHODS

DEFINITIONS

Cutoff values used in Nutrition Counts are shown in Table 1. Terms used to characterize the nutritional status of children in Nutrition Counts are:

1. Short stature (low height-for-age)
2. Underweight (low weight-for-height)
3. Overweight (high weight-for-height)
4. Probable anemia (low hemoglobin, low hematocrit)

SAMPLE

Between Fall 1989 and Spring 1990, Nutrition Counts received information on 3196 children age two years nine months to six years attending 16 Massachusetts Head Start programs. Individual programs submitted from 15 to 511 forms depending on the size of the program and the number of measurements taken.

During the same time period, Nutrition Counts also received information describing 1995 children from SSPUN sites including 23 private day care centers, 11 public preschools and 25 public school kindergartens in South and Central Berkshire County. Children enrolled in the private day care centers ranged in age from 2 months to 7 years. The preschool children ranged in age from 3 years to 6 years, and the kindergarten children ranged in age from 5 years to 8 years.

Children in the Nutrition Counts sample are representative of the Head Start, private day care programs, public preschools and kindergartens participating in Nutrition Counts only, and are not necessarily representative of all children of like age, race or socioeconomic status in the Commonwealth.

INFORMATION COLLECTED

Head Start. Head Start programs completed Nutrition Counts data forms (Appendix) once during the 1989-1990 school year. Data were coded to protect children's anonymity. Information was submitted voluntarily to Nutrition Counts by Head Start staff, who are required by federal regulations to obtain nutritional status data on all children. In general, Head Start programs submitted a data form for each child enrolled, although several programs submitted forms for a portion of the children enrolled. For each child reported, Head Start staff measured height and weight, and reported sex, age, birthdate, and date of measurement. For many children they also reported hemoglobin and/or hematocrit, free erythrocyte protoporphyrin (FEP) and/or blood lead (along with date of bloodwork), birthweight, blood pressure, and household participation in AFDC, Food Stamps, Medicaid, and WIC.

SSPUN Sites. At most private day care centers, public preschool and public kindergartens, cross-sectional data were obtained by MDPH staff who weighed and measured all children present on measuring days. At several SSPUN sites, data were collected by trained site staff. Data were collected using the Nutrition Counts data form (Appendix) which included height, weight, sex, age, race (when available), birthdate and date of measurement.

MEASUREMENT METHODS

To maximize data quality, Office of Nutrition (ON) nutrition surveillance coordinators trained Head Start and SSPUN staff in measuring children, selecting and maintaining appropriate equipment for weighing and measuring, and in using the Nutrition Counts data form. Measurers were instructed to weigh children to 1/4 pound using beam balance or SECA-770 digital scales, and to measure their heights to 1/8 inch using wall-mounted metal measuring tapes and headblocks (Handi-Stats, Perspective Enterprises, Kalamazoo, Michigan), stadiometers or length measuring boards. All SSPUN data were collected according to these protocols. Most Head Start programs complied with these protocols, but two of them lacked appropriate height measuring equipment and one lacked an appropriate scale when data collection took place in FY90. Currently (FY91), all Head Start programs in Nutrition Counts have access to appropriate equipment.

MDPH ANALYSIS

MDPH's Office of Statistics and Evaluation cleaned data to remove records with missing heights and weights or with outlying values (child's age less than 33 months with height/age or weight/age above 95th percentile, or any Z-score less than or equal to -6.0). Aggregate descriptive data were compiled using the Statistical Analysis System[3]. Z-scores and 95% confidence intervals were calculated for the proportion of children with short stature, underweight, overweight, and probable iron deficiency anemia using CASP[4] and dEpid[5] statistical software.

Prevalence estimates for underweight, short stature and overweight were considered significantly different from National Center for Health Statistics (NCHS) reference populations if 95% confidence intervals did not include the expected value of five percent.

For Head Start children, prevalence estimates were also calculated for probable iron deficiency anemia, high blood pressure, lead poisoning, and low birthweight. In these estimates, prevalence was defined as the proportion of children with the outcome under study among children with a measure of that outcome.

We also examined the Head Start sample to obtain percentages of children participating in AFDC, Food Stamps, Medicaid or other health insurance, and WIC. In addition, we estimated the proportion of children eligible for WIC according to age and nutrition risk who were not enrolled in this program. We assumed all households of Head Start children were income eligible for WIC (185% of federal poverty guidelines). Estimates of program participation and insurance coverage levels are the proportion of children participating among all children (2670) in 15 programs providing these data. No program participation or insurance data were available from one Head Start program (511 children).

All analyses were carried out by the Office of Statistics and Evaluation (OSE) at MDPH. OSE also prepares and sends Nutrition Counts data to the Centers for Disease Control (CDC) for inclusion in its national pediatric nutrition surveillance system.

DATA QUALITY

Random measuring or recording errors are unavoidable in any growth monitoring system with many observers and many data collection points. In FY90 we sought out ways of finding and minimizing systematic measurement errors that could affect the validity of our findings from Head Start programs. Data quality monitoring was not undertaken at SSPUN sites because measurements were taken by two highly trained SSPUN project staff.

To monitor data quality at Head Start programs we used computer checks and visited Head Start programs to observe measurement practices and provide brush-up training. We were specifically concerned that the high prevalence of overweight among Head Start children might be partly due to misclassification. This would occur if children's heights were measured inaccurately low, or if weights were inaccurately high; in either case, weight-for-height would be artificially inflated. In the aggregated data, there was no evidence that overweight children were more likely to have low height-for-age, nor were short children more likely to have high weight-for-height. Furthermore, while overweight increased, the prevalence of short stature declined slightly this year compared to last year.

In visits to several Head Start programs, children's measurements were taken by Head Start staff and then were repeated by an ON nutrition surveillance staffperson using Head Start's equipment. Weight measurements were taken accurately by Head Start staff. There were some errors in height measurements. In the majority of these, Head Start staff measured children slightly taller (about 1/4 inch) than ON staff did. Such errors would tend to reduce the prevalence of overweight, since they would lower weight-for-height.

DISSEMINATION AND USE OF RESULTS

Each Head Start program that participated in Nutrition Counts received an individualized report from MDPH's Office of Nutrition tabulating that program's information. Children at risk for nutrition-related problems and in need of further evaluation were identified by code only. Programs received their reports three to seven weeks from the date that all of their data arrived at MDPH. ON helped programs use the reports for follow-up of individual children and for program planning. For example, ON is assisting several Head Start programs with projects addressing obesity and anemia.

An aggregate report tabulating day care, preschool and kindergarten data was compiled by ON and SSPUN staff and distributed to participating SSPUN sites. Parents of all day care center children received special parent packets prepared by the SSPUN staff which included their child's growth chart and information on pediatric growth and nutrition.

RESULTS AND DISCUSSION

Results from Head Start programs and SSPUN sites (private day care centers, public preschools and kindergartens) are presented separately because the groups differ in: race, age range, geographic distribution, types of data collected (only anthropometric and demographic data were collected at SSPUN sites) and family income.

HEAD START

Sample. The final sample consisted of 3181 children from 16 Head Start programs (Table 2). Data on 15 (0.5%) of the original 3196 children were taken out of the sample because of missing or biologically implausible information. Within the final sample, 2282 (71.7%) had a hematocrit or hemoglobin value reported, 1891 (59.4%) had a free erythrocyte protoporphyrin (FEP) reported, and 536 (16.9%) had a blood lead value reported.

Anthropometric Evidence of Poor Nutrition. Among Head Start children, 13.3% were overweight (95% confidence interval (CI) 12.1% to 14.5%) and 7.2% had short stature (95% CI 6.3% to 8.1%) (Figure 1). These proportions are higher than the 5% expected based on reference populations. The prevalence of underweight was 1.4% among Head Start children, and was lower than expected (95% CI 1.0% to 1.8%). In individual Head Start programs, the prevalence of overweight ranged from 3.6% to 21.9%; short stature ranged from 1.5% to 16.0% and underweight ranged from 0% to 2.7% (Table 3).

Race and Anthropometry. Table 4 shows the distribution of short stature, underweight and overweight by race in the Head Start sample.

The prevalence of short stature varied across racial groups. It was most common among white and Asian children (10.9% and 14.7% respectively). These groups were over-represented among children with short stature; that is, while only 42% of Nutrition Counts children were white, 63% of children with short stature were white. Similarly, while 3% of Nutrition Counts children were Asian, 6% of children with short stature were Asian. Black and Hispanic children were under-represented among those with short stature.

Underweight was distributed proportionately and fairly evenly across racial groups. Among children with known race, overweight was highest among whites (10.6%), blacks (12.8%), and Hispanics (17.4%). In addition, Hispanic children were over-represented among overweight children. Asian children were under-represented. A substantial proportion of children without specified race were overweight (about 19%).

Birthweight and Anthropometry. Of the 3181 Head Start children in Nutrition Counts, 2271 had birthweights reported. Of these, 194 (8.5%) were low birthweight (LBW). Among children with birthweights reported, 27 (13.9%) of LBW children had heights below the fifth percentile, twice the proportion of NBW children with short stature (7.4%).

Moreover, while 1.3% of NBW children were underweight, 3.1% of LBW children were underweight. The higher proportion of underweight among LBW children in Nutrition

Counts may in part be an artifact of small sample size, since only 27 NBW and 6 LBW Head Start children with birthweights reported were underweight overall.

It is important to note that LBW can be a manifestation of either premature birth or intrauterine growth retardation (IUGR) (which can be present in both preterm and in full-term babies). We did not collect information to distinguish between low birthweight due to prematurity or IUGR. In clinical settings, ages of premature children are generally adjusted until the age of 3 years 6 months (by subtracting weeks premature from age) before plotting height on growth charts[6]. Because we were unable to make this adjustment, some children younger than 3-1/2 years who were born prematurely may have been misclassified as having short stature.

Three Year Trends. We compared prevalence estimates from FY88, FY89, and FY90 data collection in two ways to see whether any changes had occurred in proportions of children with short stature, underweight, overweight or probable iron-deficiency anemia. First, we compared data from the seven programs that submitted data in FY88, FY89, and FY90. These comparisons are among total program results and were not matched for individual children. The FY90 prevalence estimate for overweight (14.1%) was higher than it was in FY89 (9.6%) or in FY88 (9.2%). This was also true for probable iron-deficiency anemia, which rose to 12.5% in FY90 from 9.4% and 8.3% in fiscal years '88 and '89, respectively. Short stature and underweight decreased in FY90 (Figure 2).

Second, we compared prevalence estimates among all Nutrition Counts children in each year. Again, an increase in overweight and anemia was seen in FY90. Short stature decreased slightly in FY90, and underweight has remained constant from FY88 to FY90 (Figure 3).

Compared to FY88 and FY89, FY90 saw changes not only in anthropometric findings, but in the racial composition of Nutrition Counts children as well. At the seven programs with three years of data, 35% of children were Hispanic and 43% were white in FY90. By contrast, about 25% were Hispanic and 56% were white in the previous years. When all Nutrition Counts children are considered, other changes appear. In FY90 22% of children were black and 42% were white, versus about 12% who were black and about 60% who were white in FY88 and FY89. Both overweight and anemia are more common among black and Hispanic Nutrition Counts children than among white children.

Anemia; Lead Poisoning. Among the 2282 Head Start children for whom hemoglobins and/or hematocrits were available, 278 (12.2%; 95% CI 10.8% to 13.5%) had probable iron deficiency anemia, exceeding the expected value of 5% seen in reference populations (Table 5). Program prevalences ranged from 0% to 18.3%. The prevalence of probable anemia varied by race and was highest among black children (17.4%) (Figure 5). Race was unknown in 104 children with hematocrits or hemoglobins; had this information been available the race-specific estimates might be different. In addition, 9.0% (172) of 1891 children with FEP measurements had high values suggesting anemia or possible lead poisoning, and 35 (6.5%) of the 536 lead measurements were elevated. While anemia and lead poisoning may be related, we did not have enough data to examine this in our sample.

Program Participation. In FY90, 77% of the Head Start children came from families that received benefits from one or more means-tested benefit programs (AFDC, Food Stamps, Medicaid or WIC) (Table 6). Moreover, 61% of the sample participated in at least three of these programs. The most common pattern of multiple program participation was AFDC, Medicaid, Food Stamps and WIC reported in 848 (32%) of cases. These findings were similar to those from FY89.

As in FY89, about 68% of the sample was enrolled in Medicaid (Table 7). In total, 89% of the children had some form of health insurance (Medicaid or private insurance), a decrease from 95% in FY89.

Some Head Start children were from families that were not receiving benefits for which they were probably income-eligible (since they met Head Start's own income eligibility guidelines). For example, 12.9% (410) of all Head Start children in Nutrition Counts did not participate in any of the four programs we examined (Table 6). Over one quarter did not participate in AFDC (699, 26%) or Food Stamps (746, 27.9%) (not shown). Nevertheless, as in FY89, about two-thirds of Head Start children did participate in each of these programs (Table 7); the status of other children was unknown.

About 44% of Head Start children were in WIC (Table 7). Over half (51.3%) of the 1147 children eligible for WIC based on size or iron status were not enrolled in WIC (not shown). WIC certifies children who meet other nutritional risk criteria that we did not consider, including diet, and certain medical conditions. We do not know how considering these other risk factors would change our figures.

SSPUN SITES

Sample. The sample consisted of 726 infants and children from 23 day care centers, 219 children from 11 public preschools, and 1050 children from 25 public school kindergartens. Characteristics of the SSPUN groups are shown in Table 8.

Anthropometric Evidence of Poor Nutrition. Aggregated results from SSPUN sites are shown in Figure 5. Among private day care center children, 6.9% were overweight (95% CI 5.0% to 8.7%, borderline significant), while 6.2% of children had short stature (95% CI 4.4% to 8.0%, not significant). Fewer than 1% were underweight. Results for individual day care centers are presented in Table 9.

Among preschool children, 7.3% (95% CI 3.9% to 10.8%) were overweight (not significantly elevated), and 11.4% had short stature, which was a statistically significant increase above normal (95% CI 7.2% to 15.6%). Fewer than 1% were underweight. Results for individual preschools are presented in Table 10.

Among kindergarten children, 10.1% were overweight (95% CI 8.3%, 11.9%), while 5.4% had short stature (95% CI 4.1% to 6.8%), and 1.4% were underweight (95% CI 0.7% to 2.1%). Of these results, overweight and underweight were significantly different from expected values (5%). Results for individual kindergartens are presented in Table 11.

IMPLICATIONS OF FINDINGS

Probable iron-deficiency anemia, overweight, and short stature were the leading nutrition problems among the children in Nutrition Counts in FY90. The differences and similarities in anthropometric findings between Head Start, private day care centers, public preschools, and public kindergartens are intriguing and warrant further study of the relationships among growth, socioeconomic status, ethnicity, and risk of developmental or cognitive delay.

While some children are normally thinner, shorter, or heavier than their peers, in other children these conditions are symptoms of poor nutrition, poor health, or environmental stresses. When prevalence estimates are significantly higher than 5%, the causes need to be determined and actions need to be taken. Stunting and wasting may follow chronic illness or repeated acute illnesses, and may be associated with environmental stresses including poverty, lack of medical care, exposure to toxins, and disordered parent/child interactions that affect growth and feeding[7]. Children whose measures indicate they are overweight compared to peers may be obese (have excess body fat). Pediatric obesity can cause psychosocial problems, and is associated with high blood pressure, hypercholesterolemia, and respiratory problems. Moreover, it may continue into adulthood, when it is associated with diabetes, heart disease, and other health problems. Diet, heredity, lack of physical activity and stress can all contribute to pediatric obesity[8].

Children who are anemic, underweight, overweight or short for their age are a high-risk group and should receive immediate assessment and follow-up. Confirmation of diagnosis, referral to appropriate health, nutrition, and social services, and monitoring of children with extreme height, weight, or blood measures can be accomplished at Head Start programs.

Nutrition Counts data suggest overweight is common across income strata in Massachusetts preschoolers and may be common in school children as well. The prevalence of overweight was significantly elevated above normal among Head Start children and children attending kindergartens, and was elevated at borderline statistical significance in private day care centers. In three years of surveillance through Nutrition Counts, overweight has always been the most prevalent anthropometric problem. Further assessment of weight status among schoolchildren is warranted, since schools are increasingly become a focus for health promotion and nutrition education. Culturally appropriate, family-centered interventions that increase physical activity and develop healthy eating habits early in life may help reduce pediatric overweight and obesity.

The prevalence of low hematocrits and hemoglobin values (12.2%) suggests that anemia is common among Head Start children and varies with ethnicity. The causes may be dietary, environmental (i.e., from lead exposure), and/or genetic (hemoglobinopathies). Prevention and intervention strategies, based on more in-depth etiological assessment, are warranted in light of the persistent elevation of anemia over the past three years and its associated health risks. These include increased susceptibility to illness and lead poisoning, as well as attention and cognitive deficits.[9],[10]

Low-income preschoolers (especially whites and Asians) and those in a developmentally "at-risk" group had more short stature than other children observed by Nutrition Counts this year. The etiology of short stature may include not only malnutrition but also psychosocial deprivation syndromes. Hence, treatment requires careful assessment and interventions and may be best accomplished on an individual basis. Health promotion activities that ensure the good nutrition of all young children could also help reduce the prevalence of short stature.

The prevalence of underweight among Head Start and SSPUN children studied is significantly lower than expected, suggesting that acute undernutrition is not a common problem in the groups we observed. Nevertheless, among individual children, acute undernutrition is serious and warrants prompt assessment and treatment where indicated.

Low birthweight (less than 5.5 pounds), especially due to chronic intrauterine growth retardation, may affect stature throughout infancy, childhood, and even adolescence.[11],[12],[13],[14] Among Head Start children, those born at low birthweight appear to be at a higher risk for underweight as well as short stature. While some of their apparent size deficits may be accounted by correcting for premature birth, prematurity alone would not explain excessive thinness. Moreover, the rate of low birthweight among Head Start children (8.5%) in Nutrition Counts was higher than the rate in the state as a whole (less than 6%) in the mid- to late 1980's when these children were born (MDPH, 1988). This may reflect the higher level of poverty among Head Start children compared to Massachusetts children overall.

Our program participation data showed that many households in the Nutrition Counts Head Start sample used benefit programs; however, some did not. While Head Start already routinely refers families to benefit programs, our data suggest that some households still do not receive benefits for which they are eligible. To address this issue, it will be necessary to validate participation data and find out if nonparticipation by eligible households is due to lack of information about programs, lack of interest, or some other reason. Plans for improving participation should be based on these findings.

Applicability of Findings to Other Groups. We caution against using Nutrition Counts prevalence estimates to extrapolate proportions of malnourished children in other low-income preschool populations since these populations may not be comparable and programs in Nutrition Counts were not randomly selected. For example, Head Start may improve nutritional status because the program provides nutritious meals and snacks to children as well as nutrition education for staff, parents and children. This could cause our nutrition status prevalence estimates in Head Start to be lower than they might be among other low-income preschool children.

Furthermore, data from Nutrition Counts on participation in benefit programs may not apply to non-Head Start low-income households. There was a high rate of participation in benefit programs among our Head Start sample. However, households participating in Head Start may be more likely to use government benefits than other households, and are often referred to such programs by Head Start staff. Therefore, our results probably overestimate participation by low-income households in the government assistance programs studied.

RECOMMENDATIONS

1) In light of the seriousness of current funding constraints, collaborative, creative efforts are required to address the growth problems and program participation issues identified by Nutrition Counts. Coordination among local and regional Head Start staff, MDPH, Cooperative Extension's Expanded Food and Nutrition Education Program (EFNEP), ACYF, the Massachusetts Department of Education and other medical and nutrition professionals can help prevent and reduce the prevalence of overweight, short stature, and anemia in Head Start children and among other high-risk infants and children. Such coordination can also help ensure that all households eligible for means-tested benefits have access to them. Specifically, we recommend that:

- MDPH, ACYF, Head Start and EFNEP collaborate to increase the proportion of Head Start parents and staff that receive education in nutrition, eligibility for food assistance programs, and related topics. EFNEP's leadership in this initiative and its expansion to currently unserved areas of Massachusetts will be critical for success in this regard.
- MDPH should continue to work with Head Start programs to develop and pilot model health promotion projects that are community-based, family-centered and culturally appropriate.
- MDPH should work more closely with Head Start Health Coordinators to promote nutrition and health education activities.
- The Office of Nutrition and the Massachusetts Department of Education (MDOE) should collaborate to encourage Head Start programs to participate in food and nutrition programs and nutrition education offered by MDOE's Bureau of School Nutrition Services.
- The Office of Nutrition, in conjunction with Head Start staff, should develop innovative strategies that local programs can use to prevent and reduce the prevalence of overweight, short stature, anemia, and underweight.
- Surveillance of program participation levels should be continued through Head Start, particularly in light of impending budget cuts.

2) In order to improve the quality of monitoring efforts and to improve our understanding of pediatric nutrition problems in the Commonwealth:

- MDPH should support and/or participate in efforts to screen a more representative cross-sectional sample of Massachusetts children for nutrition problems. This will clarify the magnitude, severity and distribution of overweight, short stature, underweight and anemia among the Commonwealth's children so that interventions can be targeted appropriately.
- MDPH should support and/or participate in efforts to identify the etiology of iron deficiency anemia in Head Start children so that appropriate interventions can be planned.

- The Department of Public Health's Office of Nutrition should continue to work with the Head Start program to facilitate the identification, treatment, referral and follow-up of Head Start children at nutritional risk.
- The Office of Nutrition should continue to enhance nutrition assessment skills of Head Start staff through training and technical assistance, to improve the reliability of height and weight measurement techniques, and to develop Nutrition Counts reports that are timely, informative and easy to use for identification and follow-up of high-risk children.
- Finally, we recommend that interventions incorporate the *Healthy People 2000: National Health Promotion and Disease Prevention Objectives* (U.S. Public Health Service, 1990) in their planning, implementation, and evaluation. National objectives for preschoolers include reducing growth retardation, anemia, and dietary fat, and increasing the proportion of preschools providing nutrition education.

Table 1
CRITERIA FOR ABNORMAL VALUES
Nutrition Counts, FY90

Indicator		Cut-Off Value	Interpretation
Low Height-for-Age		<5th percentile[1]	Short stature; possible chronic undernutrition
Low Weight-for-Age		<5th percentile	Underweight; possible chronic or acute undernutrition
Low Weight-for-Height		<5th percentile	Underweight; possible acute undernutrition
High Weight-for-Height		>95th percentile	Overweight or possible obesity; possible chronic overfeeding or lack of activity
Low Hemoglobin[2]	1-1.9 yrs	<11.0 grams/dl	Possible iron deficiency anemia
	2-4.9 yrs	<11.2 grams/dl	
	5-7.9 yrs	<11.4 grams/dl	
Low Hematocrit[2]	1-1.9 yrs	<33%	Possible iron deficiency anemia
	2-4.9 yrs	<34%	
	5-7.9 yrs	<34.5%	
High Free Erythrocyte Protoporphyrin		≥35 ug/dl[3]	Possible iron deficiency anemia and/or lead poisoning
High Lead		≥25 ug/dl[3]	Lead poisoning
Low Birthweight		<2500 grams	Low Birthweight

---

[1] All percentiles, National Center for Health Statistics (NCHS) growth charts

[2] All anemia values, Centers for Disease Control, MMWR 38(22):400-404, 1989.

[3] Centers for Disease Control; Center for Environmental Health. Preventing lead poisoning in young children. Atlanta, GA: CDC, January 1985.

Table 2
CHARACTERISTICS OF NUTRITION COUNTS CHILDREN FROM MASSACHUSETTS HEAD START PROGRAMS, FY90

	Number	Percent
RACE		
White	1334	41.9%
Hispanic	837	26.3%
Black	698	21.9%
Asian	95	3.0%
Other	79	2.5%
Missing	138	4.3%
Total	3181	99.9%[1]
AGE		
< 3 years	42	1.3%
3-5 years	2838	89.2%
> 5 years	301	9.5%
Total	3181	100.0%
SEX		
Male	1615	50.8%
Female	1566	49.2%
Total	3181	100.0%

Source: MDPH, Office of Nutrition, 1990

---

[1] Column does not add to 100.0% due to rounding.

Table 3
MASSACHUSETTS HEAD START PROGRAMS IN NUTRITION COUNTS
PREVALENCE OF SHORT STATURE, UNDERWEIGHT, AND OVERWEIGHT

Program and State Totals, FY90

Program	Number of Children	Short Stature		Under-Weight		Over-Weight	
		N	%	N	%	N	%
ABCD	511	22	4.3	6	1.2	66	12.9
Berkshire County	256	41	16.0	3	1.2	27	10.6
Cambridge	150	5	3.3	3	2.0	26	17.3
Chelsea/CAPIC	133	2	1.5	1	0.8	14	10.5
Fall River	111	8	7.2	3	2.7	4	3.6
Framingham/SMOC	133	9	6.8	0	0.0	20	15.0
Franklin County	117	14	12.0	2	1.7	9	7.7
Greater Lawrence	206	10	4.9	4	1.9	40	19.4
Hampshire County	116	12	10.3	3	2.6	11	9.5
Leominster/MOC	314	25	8.0	3	1.0	36	11.5
New Bedford	205	25	12.2	5	2.4	15	7.3
Somerville	119	7	5.9	1	0.8	26	21.9
South Shore	115	7	6.1	2	1.7	15	13.0
Springfield	257	6	2.3	5	2.0	46	17.9
Westfield[1]	15	2	N/A	0	N/A	0	N/A
Worcester	423	35	8.3	4	1.0	68	16.1
Total	3181	230	7.2	45	1.4	423	13.3

Source: MDPH, Office of Nutrition, 1990.

---

[1] Percentages not calculated due to small program size.

Table 4
MASSACHUSETTS HEAD START PROGRAMS IN NUTRITION COUNTS PREVALENCE OF SHORT STATURE, UNDERWEIGHT, AND OVERWEIGHT BY RACE, FY90

Race	**Total**	**Short Stature (SS)**			**Underweight (UW)**			**Overweight (OW)**		
		Children in race group w/ short stature (SS) *n*	*%*	*% of all children w/ SS from race group*	*Children in race group w/ under-weight (UW)* *n*	*%*	*% of all children w/ UW from race group*	*Children in race group w/ over-weight (OW)* *n*	*%*	*% of all children w/ OW from race group*
White	1334	145	(10.9)	63.0	19	(1.4)	42.2	141	(10.6)	33.3
Black	698	28	(4.0)	12.2	10	(1.4)	22.2	89	(12.8)	21.0
Hispanic	837	35	(4.2)	15.2	11	(1.3)	24.4	146	(17.4)	34.5
Asian	95	14	(14.7)	6.1	1	(1.1)	2.2	6	(6.3)	1.4
Other[1]	79	2	(2.5)	0.9	1	(1.3)	2.2	15	(19.0)	3.6
Missing	138	6	(4.3)	2.6	3	(2.2)	6.7	26	(18.8)	6.1
Total	3181	230	(7.2%)	100.0	45	(1.4%)	99.9[2]	423	(13.3%)	99.9[2]

Source: MDPH, Office of Nutrition, 1990.

---

[1] Includes children of mixed race.

[2] Columns do not add to 100.0% due to rounding.

Table 5

MASSACHUSETTS HEAD START PROGRAMS IN NUTRITION COUNTS PREVALENCE[1] OF ABNORMAL BLOOD VALUES

Program and State Totals, FY90

Program	Hematocrit or Hemoglobin			Free Erythrocyte Protoporphyrin			Lead	
	N Measures	N Low	% Low	N Measures	N High	% High	N Measures	N High
ABCD	450	76	16.9	369	42	10.3	157	4
Berkshire	240	17	7.1	183	12	6.6	68	5
Cambridge	99	6	6.1	47	2	--	7	0
Chelsea/CAPIC	50	9	18.0	34	3	--	4	1
Fall River	101	8	7.9	106	8	7.5	2	1
Framingham/SMOC	0	0	0.0	131	4	3.1	3	0
Franklin County	77	3	3.9	54	4	7.4	24	10
Greater Lawrence	201	29	14.4	88	11	11.4	116	2
Hampshire County	89	16	18.0	80	8	7.5	21	1
Leominster/MOC	268	19	7.1	265	32	10.9	43	3
New Bedford	136	12	8.8	163	17	9.8	17	2
Somerville	60	11	18.3	69	6	7.2	5	0
South Shore	99	8	8.1	44	2	--	0	0
Springfield	110	17	15.5	23	3	--	5	2
Westfield	15	2	--	15	3	--	1	0
Worcester	287	45	15.7	220	15	6.4	63	4
Total	2282	278	12.2%	1891	172	9.0%	536	35

---

[1] Percentage calculations were omitted for samples of fewer than 50 children.

Table 6
MASSACHUSETTS HEAD START PROGRAMS IN NUTRITION COUNTS PARTICIPATION IN AFDC, FOOD STAMPS, MEDICAID AND WIC

Participation Patterns
FY89 and FY90

Number of Programs	FY89 Number & Percent Participating (N=3552)		FY90 Number & Percent Participating (N=3181)	
	N	%	N	%
All Four Programs[1]	1060	29.8	848	31.8
Any Three Programs[1]	999	28.1	779	29.2
Any Two Programs[1]	273	7.7	195	7.3
Any One Program[1]	512	14.4	236	8.8
No Programs[2]	477	13.4	410	15.4
Other[3]	231	6.5	713	7.6

Source: MDPH, Office of Nutrition, 1990.

---

[1] Indicates child's record identified child as a participant.

[2] Child's record indicates child was not a participant in any of these programs.

[3] Most data were unknown; child was not known to participate in any of these programs.

Table 7
MASSACHUSETTS HEAD START PROGRAMS IN NUTRITION COUNTS PARTICIPATION IN AFDC, FOOD STAMPS, MEDICAID AND WIC
Participation Patterns
FY89 and FY90

Program	FY89 Number & Percent Participating[1] N=3552		FY90 Number & Percent Participating[1] N=2670[2]	
	N	%	N	%
AFDC	2206	62.1	1659	62.1
Food Stamps	2179	61.3	1700	63.7
Medicaid	2427	68.3	1814	67.9
WIC	1483	41.8	1182	44.3

Source: MDPH, Office of Nutrition, 1990.

---

[1] Includes children reported participating. Children not counted as participants include definite non-participants and those with unknown participation.

[2] Represents all children at the 15 Head Start programs that were able to provide program participation data in FY90.

Table 8

CHARACTERISTICS OF NUTRITION COUNTS CHILDREN FROM BERKSHIRE COUNTY PRIVATE DAY CARE CENTERS, PUBLIC PRESCHOOLS, AND PUBLIC SCHOOL KINDERGARTENS, FY90

Characteristic	Day Care		Preschool		Kindergarten	
	n	%[1]	n	%	n	%[1]
RACE						
White	666	91.7%	109	49.8%	447	42.6%
Black	32	4.4%	1	0.5%	6	0.6%
Asian	13	1.8%	2	0.9%	1	0.1%
Hispanic	2	0.2%	2	0.9%	1	0.1%
Other	1	0.1%	0	0.0%	0	0.0%
Missing	12	1.7%	105	47.9%	595	56.7%
Total	726	99.9%	219	100.0%	1050	100.1%
AGE						
≤ 1 year	9	1.2%	0	0.0%	0	0.0%
> 1-3 yrs	94	12.9%	0	0.0%	0	0.0%
> 3-6 yrs	602	82.9%	216	98.6%	770	73.3%
> 6 years	21	2.9%	3	1.4%	280	26.7%
Total	726	99.9%	219	100.0%	1050	100.0%
SEX						
Male	383	52.8%	119	54.3%	532	50.7%
Female	343	47.2%	100	45.7%	518	49.3%
Total	726	100.0%	219	100.0%	1050	100.0%

Source: MDPH, Office of Nutrition and Office of Statistics & Evaluation, 1990

---

[1] Column does not add to 100.0% due to rounding.

Table 9
BERKSHIRE COUNTY PRIVATE DAY CARE CENTERS IN NUTRITION COUNTS
PREVALENCE OF SHORT STATURE, UNDERWEIGHT, AND OVERWEIGHT

Program and State Totals, FY90

Program	Number Of Children	N Short Stature	N Under-Weight	N Over-Weight
Berkshire Family Center	44	3	0	7
Boys' Club	66	1	0	5
Dalton Childrens	12	1	0	1
Egremont Coop	10	1	0	2
Elms Nursery	46	0	0	1
G. Brigham C.C.	43	9	0	2
Great Barrington	27	0	2	1
Kids Preschool	35	0	1	2
Knesset Israel	34	1	0	2
Learning Center	53	5	0	3
Lee Youth Association	11	1	0	2
Lenox Childrens	23	2	0	1
Montessori	28	1	0	1
Pittsfield Girls Club	13	2	0	0
Red Door	32	1	0	1
Richmond Preschool	29	1	0	4
Rockwell E.C.C.	33	7	0	2
S. Berkshire E.C.C.	12	2	0	2
St. Paul's C.C.	28	2	0	0
Sunshine Nursery	10	0	0	0
Tot Spot	56	2	0	2
Wendell Nursery	28	2	0	0
YMCA E.C.C.	53	1	1	9
Totals	726	45	4	50
		(6.2%)	(0.6%)	(6.9%)

Table 10
BERKSHIRE COUNTY PUBLIC PRESCHOOLS IN NUTRITION COUNTS PREVALENCE OF SHORT STATURE, UNDERWEIGHT, AND OVERWEIGHT

Program and State Totals, FY90

Program	Number of Children	N Short Stature	N Under-Weight	N Over-Weight
Craneville	20	2	0	0
Crosby	9	2	0	0
Lanesboro	12	1	0	2
Lee Central	35	4	0	5
Morningside	15	2	0	1
Morris	11	2	0	1
Otis	22	2	0	1
Sandisfield	6	1	0	0
Sheffield	31	3	0	2
Stockbridge	10	1	1	0
West Side	48	5	0	4
Total	219	25	1	16
		(11.4%)	(0.5%)	(7.3%)

Source: MDPH, Office of Nutrition and
Office of Statistics & Evaluation, 1990

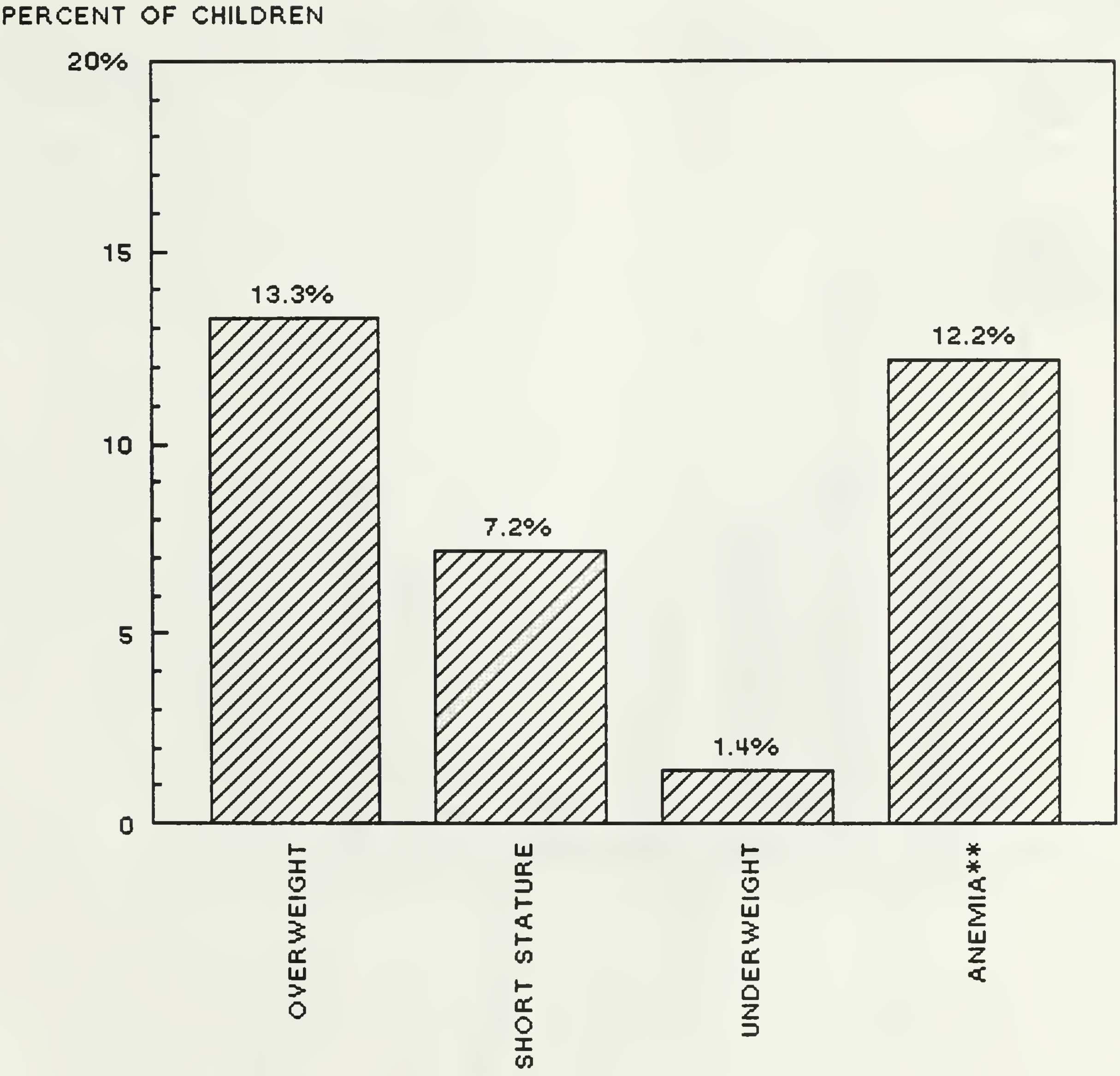
Table 11
BERKSHIRE COUNTY PUBLIC KINDERGARTENS IN NUTRITION COUNTS
PREVALENCE OF SHORT STATURE, UNDERWEIGHT, AND OVERWEIGHT
Program and State Totals, FY90

Program	Number of Children	N Short Stature	N Under-Weight	N Over-Weight
Alford	16	1	0	1
Allendale	70	4	0	3
Becket	31	1	0	4
Bryant	34	0	0	4
Craneville	86	9	1	9
Crosby	89	2	2	7
Egremont	75	5	2	6
Hancock	6	0	0	1
Highland	42	5	1	1
Hinsdale	34	0	1	4
Housatonic	35	1	2	7
Lanesboro	58	2	0	6
Lee Central	48	3	0	4
Monterey	12	0	0	3
Morningside	85	3	2	4
Morris	40	3	1	6
Otis	19	1	0	3
Richmond	22	2	0	2
Sandisfield	6	1	0	1
Sheffield	29	3	0	3
Stearns	22	0	0	2
Stockbridge	19	1	0	2
West Side	88	7	3	16
W. Stockbridge	21	1	0	2
Williams	63	2	0	5
Total	1050	57	15	106
		(5.4%)	(1.4%)	(10.1%)

Source: MDPH, Office of Nutrition and
Office of Statistics & Evaluation, 1990

FIGURE 1

OVERWEIGHT, SHORT STATURE, UNDERWEIGHT & ANEMIA HEAD START CHILDREN

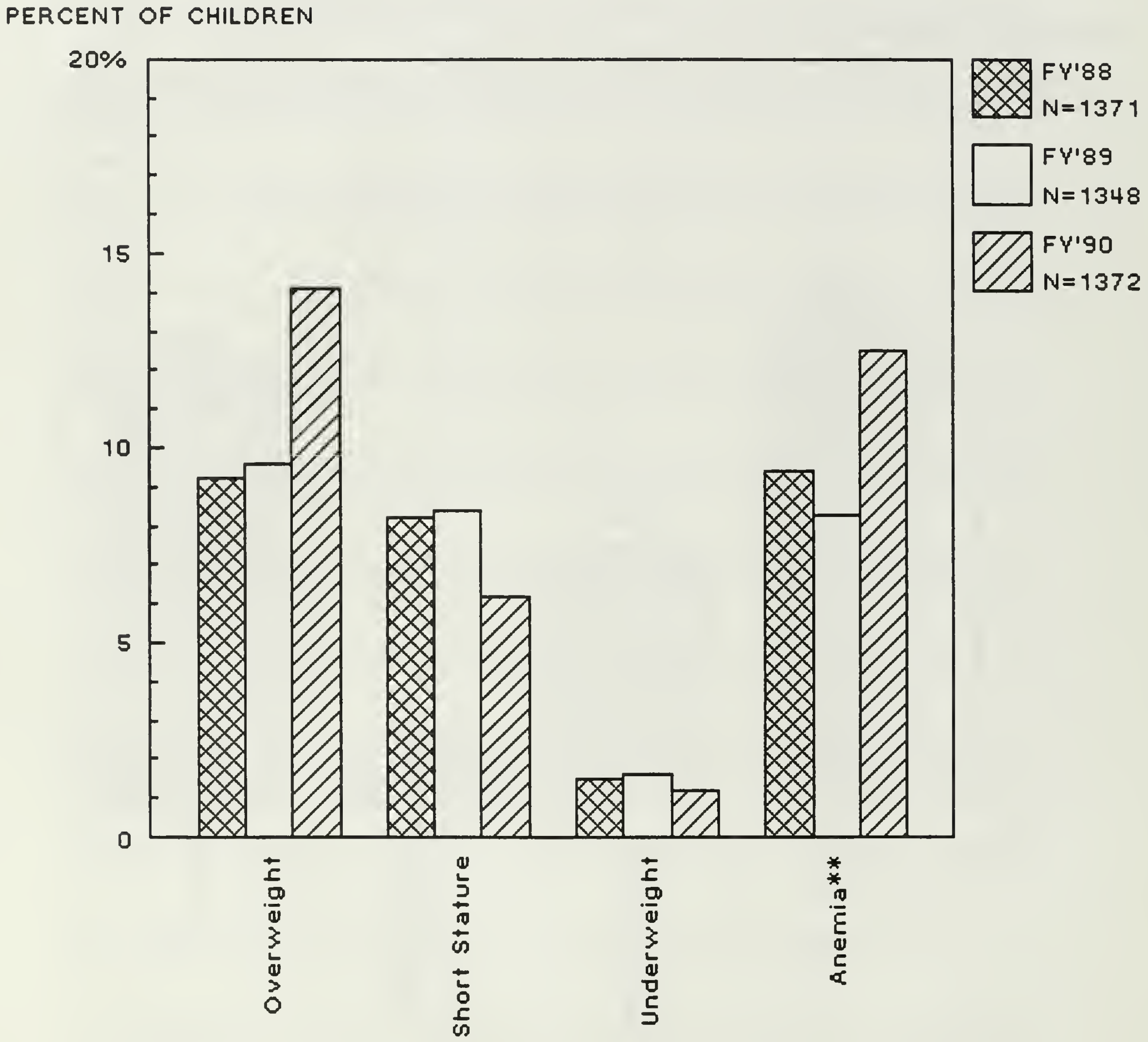


* EXPECTED PREVALENCE
N=3181
**N=2282

NUTRITION COUNTS, FY'90
SOURCE: MDPH, ON, OSE, 1990

FIGURE 2

COMPARISON OF FY'88, FY'89 AND FY'90 RESULTS
7 HEAD START SITES WITH CONTINUOUS PARTICIPATION



* Expected Prevalence

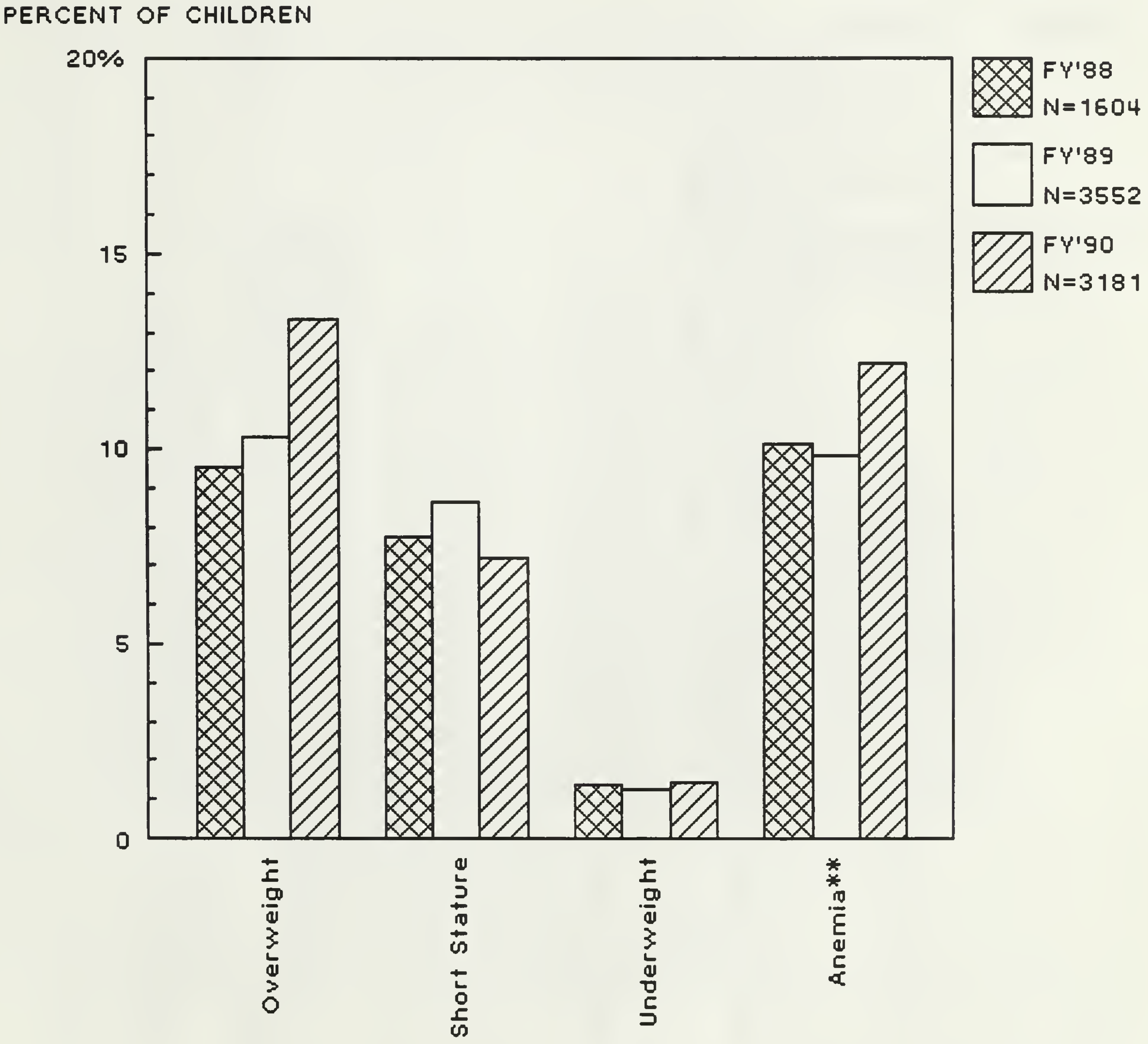
Source: MDPH, ON AND OSE, 1990

MASSACHUSETTS NUTRITION COUNTS

** FY'88 N=955
FY'89 N=935
FY'90 N=891

FIGURE 3

COMPARISON OF FY'88, FY'89 AND FY'90 RESULTS ALL PARTICIPATING HEAD START PROGRAMS



* Expected Prevalence

Source: MDPH, ON AND OSE, 1990

MASSACHUSETTS NUTRITION COUNTS

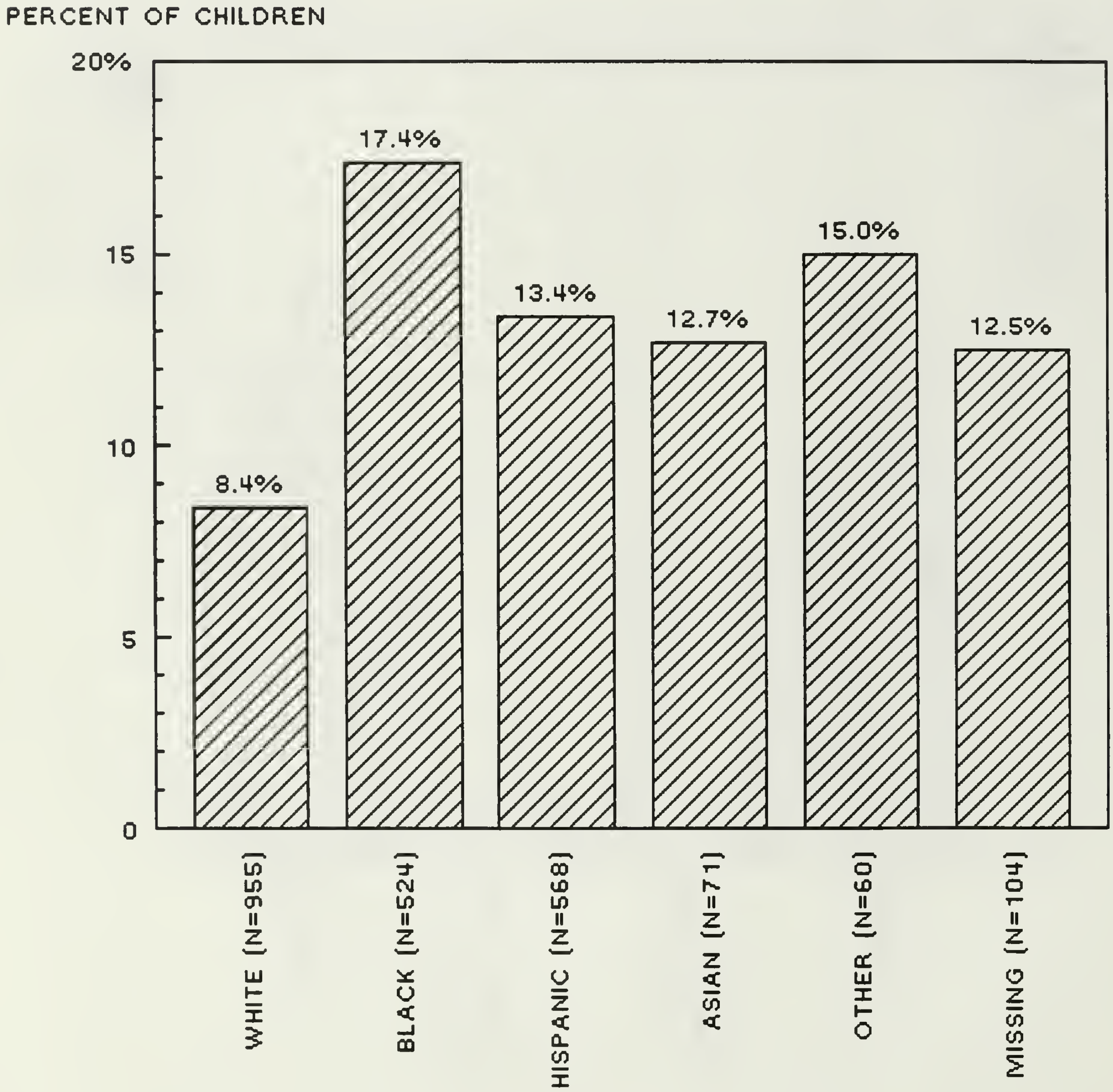
** FY'88 N=1165

FY'89 N=2359

FY'90 N=2282

FIGURE 4

PREVALENCE OF PROBABLE ANEMIA* BY RACE
HEAD START CHILDREN



N=2282

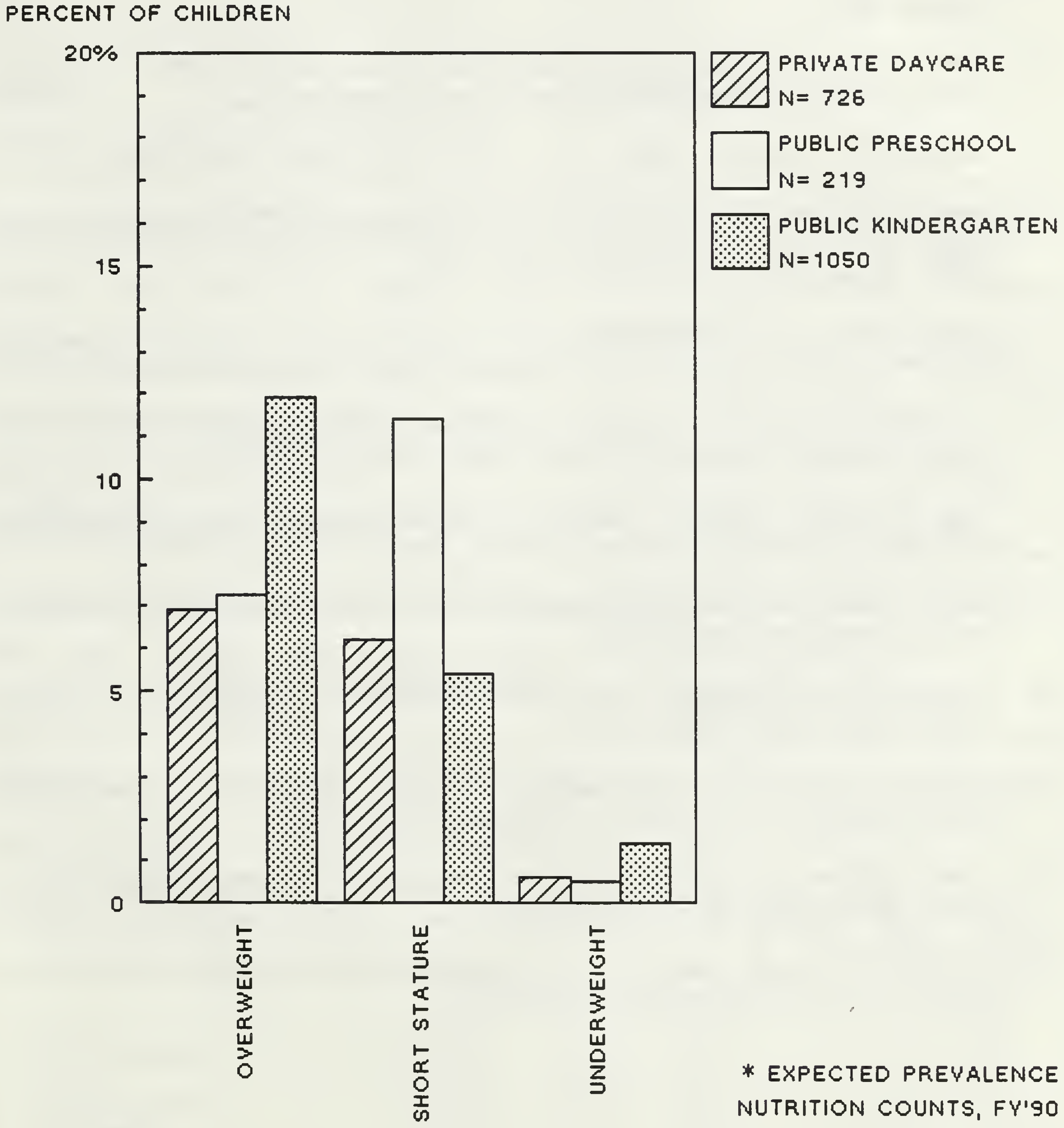
* ANEMIA BY EITHER HGB OR HCT VALUE

NUTRITION COUNTS, 1990

SOURCE: MDPH, ON, OSE, 1990

FIGURE 5

OVERWEIGHT, SHORT STATURE AND UNDERWEIGHT PRIVATE DAYCARE, PUBLIC PRESCHOOL & KINDERGARTEN



* EXPECTED PREVALENCE
NUTRITION COUNTS, FY'90
SOURCE: MDPH, ON, OSE, 1990

SOURCE NOTES

1. 1983 Massachusetts Nutrition Survey. Division of Family Health Services, Massachusetts Department of Public Health. Boston: October, 1983.
2. Pediatric Pilot of the Massachusetts Nutrition Surveillance System: Analysis and Recommendations. Massachusetts Department of Public Health. Boston: October, 1986.
3. SAS Institute, Inc. SAS User's Guide: Basic's Version 5 Edition. Cary, NC: SAS Institute, 1985.
4. Goldsby JB. Pct119d anthropometry Fortran subroutines. Atlanta: Centers for Disease Control, Nutrition Division, Health Promotion and Education, 1972.
5. Sullivan KM, Foster DA. dEPID, V.2.1. Atlanta: Centers for Disease Control, 1987.
6. Peterson KE, Frank DA: Feeding and Growth of Premature and Small-for-Gestational-Age Infants. In Taeuch HW, Yogman MW (eds.): Follow-Up Management of the High-Risk Infant. Boston: Little, Brown and Company, 1987.
7. Rathbun JM, Peterson KE: Nutrition in Failure-to-Thrive. In: Grand RJ, Sutphen JL, Dietz WH (eds.): Pediatric Nutrition: Theory and Practice. Boston: Butterworths, 1987.
8. Winick M: Childhood Obesity: Special Reference Briefs. NAL SRB 88-05. Beltsville, Maryland: National Agricultural Library, USDA, 1988.
9. Clark M, Royal J, Seeler R. Interaction of iron-deficiency and lead and hematologic findings in children with severe lead poisoning. Pediatrics 1988; 81:247-254.
10. Oski FA, Honig AS. The effects of therapy on the developmental scores of iron-deficient infants. J Pediatrics 1978; 92:21-25.
11. Fitzhardinge PM, Steven EM. The small-for-date infant: I. Later growth patterns. Pediatrics 1972; 49:671-681.
12. Bech GJ, van de Berg BJ: The relationship of the rate of intrauterine growth of low birthweight infants to later growth. J Pediatrics 1975; 86:504-511.
13. Villar J, Belizian JM, Spaulding J et al.: Post-natal growth of intrauterine growth retarded infants. Early Human Dev 1982; 6:265-0271.
14. Gayle HD, Dibley MJ, Marks JS, Trowbridge FL: Malnutrition in the First Two Years of Life. Am J Dis Children 1987; 141:531-534.

5453 050

Nutrition Counts

SITE ☐☐ TOWN ☐☐☐

Pediatric Health and Nutrition Data Form

1. CHILD IDENTIFICATION
   a. first 3 letters of last name 1a. ☐☐☐
   b. child code or record number b. ☐☐☐☐☐☐☐☐☐

2. CHILD'S HOME ZIP CODE 2. ☐☐☐☐☐

3. DATE OF BIRTH (MM/DD/YY) 3. ☐☐ / ☐☐ / ☐☐ IS BIRTH YEAR CORRECT?

4. SEX (M or F) 4. ☐

5. RACE 1. White 2. Black 3. Hispanic 4. Asian/Pacific Islander 5. American Indian/Alaskan Native 6. Other (Specify) __________ 9. Unknown 5. ☐

6. ANCESTRY 1. Puerto Rican 2. Cambodian/Vietnamese/Laotian 3. Cape Verdean 4. Other Portuguese 5. Haitian 6. Pakistani/Asian Indian 7. European or African American 8. Other (Specify) ________ 9. Unknown 6. ☐

---

7. DATE OF HEIGHT/WEIGHT MEASUREMENT 7. ☐☐ / ☐☐ / ☐☐

8. HEIGHT (Note: 1/4"=2/8ths 1/2"=4/8ths 3/4"=6/8ths) 8. ☐☐ inches ☐ /8ths

9. WEIGHT (Note: 1/2lb=2/4ths) 9. ☐☐ lbs ☐ /4ths

---

10. DATE OF MOST RECENT HEMOGLOBIN OR HEMATOCRIT 10. ☐☐ / ☐☐ / ☐☐

11. HEMOGLOBIN (most recent) 11. ☐☐ . ☐ gms/100ml

or

12. HEMATOCRIT (most recent) 12. ☐☐ . ☐ percent

---

13. DATE OF MOST RECENT FEP OR LEAD TEST 13. ☐☐ / ☐☐ / ☐☐

14. FEP (EP) 14. ☐☐☐ ug/dl

or Please make sure FEP and LEAD values have not been switched

15. LEAD (Pb) 15. ☐☐☐ ug/dl

---

16. BIRTHWEIGHT 16. ☐☐☐☐ grams OR ☐☐ lbs ☐☐ oz

17. BLOOD PRESSURE (systolic/diastolic) 17. ☐☐☐ / ☐☐☐

---

18. PROGRAM PARTICIPATION AND INSURANCE (check one box for each item)

		Yes	No	Don't Know		DPH Use Only
a. WIC	a.	☐	☐	☐	a.	☐
b. Food Stamps	b.	☐	☐	☐	b.	☐
c. AFDC	c.	☐	☐	☐	c.	☐
d. CommonHealth	d.	☐	☐	☐	d.	☐
e. Medicaid	e.	☐	☐	☐	e.	☐
f. Blue Cross/Blue Shield	f.	☐	☐	☐	f.	☐
g. HMO	g.	☐	☐	☐	g.	☐
h. Other Health Insurance	h.	☐	☐	☐	h.	☐

ACME
BOOKBINDING CO., INC.

NOV 30 1991

100 CAMBRIDGE STREET
CHARLESTOWN, MASS